SUSTAINABLE LIVESTOCK DEVELOPMENT IN MANITOBA

FINDING COMMON GROUND

Report prepared for the Government of Manitoba
by the Livestock Stewardship Panel

Ed Tyrchniewicz, Chair • Nick Carter • John Whitaker

December 2000

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LETTER OF TRANSMITTAL

Office of the Livestock Stewardship Panel
305 – 155 Carlton St
Winnipeg MB R3C 3H8

December 2000

The Hon. Rosann Wowchuk
Minister of Agriculture and Food

The Hon. Jean Friesen
Minister of Intergovernmental Affairs

The Hon. Oscar Lathlin
Minister of Conservation

Dear Ministers:

We are pleased to submit our report on expansion of Manitoba's livestock sector, entitled *Sustainable Livestock Development in Manitoba: Finding Common Ground.* The report summarizes our consultations with Manitobans, together with our conclusions and recommendations.

The Panel is convinced that "common ground" can be found for sustainable livestock development in Manitoba. However, It will require commitment and action by the Government of Manitoba and the livestock industry to deal with the many concerns about the impact of livestock expansion on Manitoba's environment and rural landscape. It will also require a greater willingness on the part of opponents of the livestock industry to recognize that sustainable livestock development is not inherently bad. We believe this report contains recommendations and suggestions that can be used by all to find the "common ground".

We wish to acknowledge the overall quality, sincerity and thought-provoking nature of presentations, submissions and discussions that we have had with a broad range of people and organizations during our public meetings and subsequent deliberations. The assistance and professionalism of your staff was of great value to us in our work; we sincerely appreciate their efforts.

It has been our pleasure to undertake this challenging assignment!

Respectfully submitted,

Ed Tyrchniewicz
Chair of Panel

Nick Carter
Member

John Whitaker
Member

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PREFACE

In March 2000, the Government of Manitoba formally announced its Livestock Stewardship Initiative (LSI) with the aim of ensuring the sustainable development of Manitoba's livestock industry. A Livestock Stewardship Panel was appointed by the Government of Manitoba on June 7, 2000 with a mandate to seek the views of Manitobans on the expansion of the livestock industry in Manitoba, and to present these to government in a report along with recommendations.

The Panel is convinced that "common ground" can be found for sustainable livestock development in Manitoba. It will require a commitment by the provincial government and the livestock industry to deal with many concerns about the impact of livestock on Manitoba's environment and rural landscape. It will also require a greater willingness on the part of opponents of the livestock industry to recognize that sustainable livestock development is not inherently bad. This report contains recommendations and suggestions that can be used by all to find the "common ground".

Many people played a role in helping the Panel in its efforts, and we wish to acknowledge them. First and foremost, we acknowledge the overall quality, sincerity, and thought-provoking nature of presentations and submissions made by the individuals and organizations that participated in all aspects of our public consultation process. The input of industry and government representatives and researchers in their very generous response to our requests for information is gratefully appreciated. The analytical and scientific assistance of Heather Gregory and Ross Bulley was invaluable. The efforts of Rory Grewar and Jim Potton in organizing the public meetings were truly professional, as was Jim Rae's communication and logistical support. Editorial assistance from Buzz Crooks, Rosemarie Prokipchuk, Joyce Mueller, and Jim Petsnick helped to move our sow's ear in the direction of a silk purse. Finally, our wives deserve a special debt of gratitude for enduring endless talk about "pig stuff" during meals and social gatherings!

The Panel alone takes responsibility for all views expressed in this report and any errors of commission or omission contained herein.

Ed Tyrchniewicz
Nick Carter
John Whitaker

LIST OF ABBREVIATIONS USED IN THE REPORT

AU:	animal unit
CEC:	Clean Environment Commission
COSDI:	Consultation on Sustainable Development Implementation
DU:	Ducks Unlimited
EMS:	electromagnetic spectrometry
EPA:	Environment Protection Agency
GIS:	Geographic Information System
GMO:	genetically modified organism
GPS:	global positioning system
HACCP:	Hazard Analysis Critical Control Points
IISD:	International Institute for Sustainable Development
ILO:	intensive livestock operation
MHHC:	Manitoba Habitat Heritage Corporation
NGO:	non-government organization
ODTS:	organic dust toxic syndrome
PAMI:	Prairie Agricultural Machinery Institute
PFRA:	Prairie Farm Rehabilitation Administration
REDI:	Rural Economic Development Initiative
RM:	rural municipality
TRC:	technical review committee
USFDA:	United States Food and Drug Administration

EXECUTIVE SUMMARY

Panel's Mandate and Process

In March 2000, the Government of Manitoba formally announced its Livestock Stewardship Initiative (LSI) with the aim of ensuring the sustainable development of Manitoba's livestock industry. In essence, this means giving consideration to environmental stewardship and social factors as well as to economic viability. A Livestock Stewardship Panel was appointed by the Government of Manitoba on June 7, 2000 with a mandate to seek the views of Manitobans on the expansion of the livestock industry in Manitoba, and to present these to government in a report along with recommendations.

After the release of *Livestock Stewardship 2000: A Public Discussion Paper* in June 2000, six public meetings were held throughout Manitoba. The Panel heard more than 225 presentations from a wide cross-section of people and organizations. In addition, the Panel received approximately another 150 written submissions and additional information pieces. The Panel also attended a series of one-on-one follow-up meetings with key industry, government, and public interest stakeholders to gather further elaboration on points made during public presentations.

After reviewing the material presented in oral and written submissions, the Panel concluded that we needed a better scientific understanding of a number of technical issues. To that end, the Panel convened four research roundtables at the end of August to further explore questions relating to water quality, air quality, manure management, and monitoring and information systems. Scientists and practitioners knowledgeable in these matters were invited to meet with the Panel for further discussions.

The Panel also met with a wide range of provincial and federal officials, university and industry researchers, producer organizations and public stakeholder groups to enhance its understanding of these issues and explore alternative solutions. These discussions took place in Manitoba, Saskatchewan, Alberta, Quebec and Ottawa.

Key Conclusions

Many conclusions were drawn throughout the report. What follows is a synthesis of key themes.

- Public apprehension about intensive livestock operations (ILOs) is being driven by several factors: experiences in other jurisdictions, declining familiarity with what is happening on farms, the occasional local "horror story", and the perception of insufficient monitoring of ILOs.
- The government is seen as the custodian of public interest in the environment. The public needs to be confident that government is ensuring that "things are being done right", and must have access to information to be assured of this.
- Current regulations and guidelines for ILOs, for the most part, are adequate; however, monitoring and enforcement are not.
- Progress towards sustainable livestock development in Manitoba must be based on reliable information, and not emotion. This information should be drawn from research and practical experience, and must be relevant to the Manitoba situation.
- It is important to recognize that there are two broad types of farms: large commercial farms that produce primarily for export, and farms that derive limited income from agriculture, or are in transition. The same policies and regulations will not work for both groups.
- Although much of the Panel's focus has been on hogs, it believes that beef production in Manitoba is sustainable, providing the issues of

riparian management and processing capacity are addressed.

- Manure is a valuable product, capable of replacing expensive inorganic fertilizer and improving the soil, and should not be treated as a waste.
- The Panel believes that expansion of ILOs can be sustainable in Manitoba, provided that government follows the recommendations contained in this report.

Synthesis of Key Recommendations

The Panel has identified four key recommendations that are critical to achieving sustainable livestock development in Manitoba. A series of supporting recommendations are contained in the body of the report.

1. Role of Provincial Government in Sustainable Livestock Development

Of the 40 or so recommendations presented in this report, about two-thirds address the involvement of the provincial government directly in the intensive livestock industry. It is not surprising, therefore, that the overarching recommendation from the Panel stresses the need for the commitment of staff and financial resources to be devoted to two tasks: first, to gain a full understanding of the present situation of such operations in the overall milieu of agriculture in the province, and secondly, to provide a regulatory framework and a monitoring and enforcement effort in which expansion can take place without damage to Manitoba's people or environment.

In this regard, the Panel **strongly recommends** that:

- **Government focus substantially increased resources on the intensive livestock industry in Manitoba to provide analysis, guidance, inspection, monitoring, enforcement and technological assistance that can accommodate the present scale of the industry and anticipate its expansion.**
- **Capability to undertake comprehensive analysis of the potential impact of new or expanded ILOs upon both local and larger area environments should be enhanced immediately in order to lead to strong critical decisions.**
- **Government develop and make public the policy framework through which livestock expansion will take place, stressing its concern for sustainability.**

2. Publicly Available Information

Policies for the future are shaped by past experience, knowledge of present circumstances and reliable information. This reliable information must be available not only to government and industry, but also to the concerned public.

The Panel **recommends:**

- **The Government of Manitoba should accumulate all relevant data concerning livestock operations in a central openly available information system in a geographic information (GIS) format to provide Manitobans with a realistic assessment of the sustainability of current operations and their effect on both the local and provincial environments.**

3. Role of ILOs in Rural Development

The provincial government is challenged to promote rural development in a sustainable manner. The Panel believes that ILOs can play an important role in rural development through generation of employment and income, but they should not be seen as the only option. Farmers who wish to produce and market animals without going the ILO route should be assisted.

The Panel **recommends:**

- **In light of socio-economic concerns about livestock expansion, the Government of Manitoba should take a two-pronged policy approach to encouraging sustainable livestock development in Manitoba.**

- **For large scale livestock operations, monitor and enforce environmental and health regulations with a view to enabling these farms to be competitive in export markets while ensuring environmental stewardship.**

- **For farmers in transition and those who currently derive limited income from farming, develop a package of programs that will enable these farmers to adjust their farming operations to a level that will provide them with an acceptable quality of life. This could also include a greater focus on higher animal welfare production systems.**

4 Decision Process for Siting ILOs

The Panel regards a carefully considered decision on the siting of ILOs to be of prime importance in sustainable livestock development, particularly in protecting the environment. It is essential that local circumstances, especially as pertaining to land use, be very thoroughly thought through. It is also essential that the province, being in a better position to assess environmental factors on a larger area basis in depth, have a say in the siting of ILOs.

The Panel **recommends:**

- **New and expanding ILOs should require formal approval by both the host municipality for compliance with land use by-laws, and the province for environmental impact before construction is allowed to begin.**

Concluding Comment

The Panel is convinced that "common ground" can be found for sustainable livestock development in Manitoba. It will require a commitment by the provincial government and the livestock industry to deal with many concerns about the impact of livestock on Manitoba's environment and rural landscape. It will also require a greater willingness on the part of opponents of the livestock industry to recognize that sustainable livestock development is not inherently bad. We believe our report contains recommendations and suggestions that can be used by all to find the "common ground".

CHAPTER 1

INTRODUCTION

Manitoba's Livestock Stewardship Initiative

In March 2000, the Government of Manitoba formally announced its Livestock Stewardship Initiative (LSI) with the aim of ensuring the sustainable development of Manitoba's livestock industry. In essence, this means giving consideration to environmental stewardship and social factors as well as to economic viability. In June 2000, the Government of Manitoba, through three provincial departments - Manitoba Agriculture and Food, Manitoba Conservation and Manitoba Intergovernmental Affairs - released the document, *Livestock Stewardship 2000: A Public Discussion Paper.*

The objective of this document was to raise awareness, stimulate thought and focus public discussion. It provided an historical overview, trends influencing the industry, and outlined the existing regulatory and approval process in Manitoba and other jurisdictions in Canada and the United States. It also summarized Manitobans' foremost concerns surrounding livestock industry expansion – specifically, environmental protection, land use planning, quality of life and the vibrancy of the rural economy.

This document was the starting point for public discussions to be conducted by the Livestock Stewardship Panel.

Livestock Stewardship Panel

The Livestock Stewardship Panel was appointed by the Government of Manitoba on June 7, 2000. Members of the Panel were Nick Carter, John Whitaker, and Ed Tyrchniewicz (Chair).

Mandate

The Panel was given the following mandate:

- To seek the views of Manitobans on the expansion of the livestock industry in Manitoba, and to present these to government in a report so that government and the public may take these views into consideration for future policy development.
- To hold public meetings in a manner designed to encourage maximum involvement and input from the public. The Panel could engage in both formal and informal discussions with citizens.
- To hear submissions from citizens at the public meetings on issues mentioned in the *Livestock Stewardship 2000 Discussion Paper* and any others that, in the opinion of the Panel, were related to the issues mentioned in the paper. The Panel would also receive written submissions.
- To produce a report and recommendations that were to be based on:
  - information gathered through presentations and written submissions,
  - the Panel's own knowledge and expertise,
  - information provided by departmental staff at the request of the Panel, and
  - other relevant information.
- To present a report with recommendations to the Ministers of Agriculture and Food, Conservation and Intergovernmental Affairs in the fall of 2000.

The Panel was not expected to deal with the operation of meat processing plants, the expansion of Schneider's Winnipeg facility or the location of specific hog barns.

The Process

After the release of the *Discussion Paper* in June 2000, six public meetings were held in Morden, Arborg, Brandon, Dauphin, Winnipeg and Steinbach between June 29 and August 1. The Panel heard more than 225 presentations totaling over 60 hours from a broad cross-section of people and organizations. In addition, the Panel received approximately another 150 written submissions and additional information pieces. The Panel also attended a series of one-on-one follow-up meetings with key industry, government, and public interest stakeholders to garner further elaboration on points made during public presentations. The Panel wishes to acknowledge the overall quality, sincerity, and thought-provoking nature of presentations and submissions made by those who participated in all aspects of the public consultation process.

After reviewing the material presented in oral and written submissions, the Panel concluded that there was a need for a better scientific understanding of a number of technical issues. Accordingly, four research round tables were convened at the end of August to consider issues relating to water quality, air quality, manure management, and monitoring and information systems. Scientists and practitioners knowledgeable on these matters were invited to meet with the Panel to discuss each of these topics. Dr. Ross Bulley, a noted authority on these matters, served as a scientific advisor to the Panel at these discussions. Dr. Bulley, now retired, is the former Head of the Department of Biosystems Engineering at the University of Manitoba. He is a recognized authority on environmental aspects of livestock production, especially manure management.

In order to gain a better understanding of the state of knowledge and experience in other jurisdictions, the Panel traveled to Ottawa, Quebec, Saskatchewan and Alberta to consult with federal and provincial agencies, university specialists, industry research and development groups, and producer/industry organizations. This was an opportunity to learn about regulatory approaches, and their effectiveness, that had been implemented elsewhere, as well as to become familiar with new technologies and management practices that might be applicable in Manitoba.

Organization of the Report

Chapter 2 of this report provides background that is useful in understanding the issues, including the changing structure of Manitoba's agriculture, a perspective on livestock sector development and a historical perspective on livestock and the environment. Chapter 3 outlines some principles for sustainable development. Chapter 4 is a summary of what the Panel heard at the public meetings. Chapters 5 through 9 contain an analysis of the key livestock sustainability issues, specifically: planning and regulatory issues, environmental and health concerns, management issues, socio-economic issues, and information systems and research issues. Chapter 10 is a summary and synthesis of the Panel's conclusions and recommendations.

The report also includes a list of selected references and appendices. Appendix A contains a list of all those individuals who made presentations at the public meetings. Appendix B contains a list of all those individuals and organizations that made written submissions and provided additional information to the Panel. Appendix C lists the participants in the Panel's research round tables. Appendix D lists the various individuals and organizations visited by the Panel outside of Manitoba. Various technical documents prepared for the Panel by Heather Gregory of Pivotal Plus Consulting and Ross Bulley are included in a separate technical report.

CHAPTER 2

BACKGROUND

In order to better understand the current issues surrounding livestock expansion in Manitoba, it is useful to elaborate on some of the forces driving agricultural development. While there are many such forces, the Panel has chosen to focus on three: the changing structure of Manitoba's agriculture, a perspective on livestock sector development, and an historical perspective on livestock and the environment.

Changing Structure of Manitoba's Agriculture

Introduction

The presence of large numbers of "livestock" has been part of the western Canadian landscape for thousands of years. These animals, of course, were buffalo (bison), and they have sustained First Nations peoples for hundreds of generations. Their effect on the landscape was, at times, dramatic, and would today be called pollution. Friesen (1984) described them as follows:

> *These animal giants traveled in herds numbered in the thousands and tens of thousands in the summer time, and simply swallowed up the land in their path. Isaac Cowie's party met buffalo near the Qu'appelle Valley: its 'route took us into the midst of the herd, which opened in front and closed behind the train of carts like water round a ship ... the earth trembled day and night ... as they moved ... over the inclinations of the plains. Every drop of water on our way was foul and yellow with their wallowings and excretions'.*

With the coming of European settlers about 125 years ago, agriculture replaced hunting as the way of life and attention became focused on producing grain for foreign markets. Vast quantities were grown and exported; millions of people were fed and relative prosperity prevailed on the Canadian prairies. But times have changed and our agricultural industry has had to deal with the challenges of this change. Countries that were once customers have become competitors. Making a living producing grain for export has become more difficult, but farmers in Manitoba are moving towards meeting this challenge by expanding their production of specialty crops and livestock.

Farm Population Trends

Today, only about 7 percent of Manitoba's total population is employed on farms. In the last census year (1996), farmers and their families numbered 79,840 people. By comparison, in 1971 over 13 percent of the population was employed on farms and over 131,000 people lived on farms.

Structure of Farms

In 1996, family-operated farms accounted for 98 percent of farms, while non-family corporations represented less than two percent of the farms in Manitoba. During the period from 1986 to 1996, more farm families entered into partnerships or operating agreements and sole proprietorships dropped to about 60 percent of farms.

According to the 1996 Census of Agriculture, only 18 percent of farm operators were less than 35 years old, three percent less than the 1991 figure. Over 51 percent of the farm operators were 35 to 54 years of age and 31 percent were age 55 or older. Over 30 percent of all farmers had some off-farm employment. A revealing statistic is that for all Manitoba farms 43 percent of total family income comes from off-farm sources.

Farms and Farm Investment

With the decline in the farm population, the farming sector has consolidated with fewer, but larger, farms with more capital investment per farm. In 1996, there were about 24,400 farms in Manitoba, a decrease of more than 30 percent

from 1971. By 1999, the number of farms had further declined to an estimated 23,400. The average size of Manitoba farms rose from 543 acres in 1971 to 784 acres by 1996. There has been an increasing trend to rent land rather than buy it. By 1996, 64 percent of farmland was operator-owned while 36 percent was rented.

A natural result of farm consolidation has been the increase in capital investment per farm. Between 1971 and 1996, average capital investment per farm increased from less than $60,000 to over $500,000. For 1999, Manitoba Agriculture and Food has estimated that the average capital investment for a farm is almost $600,000.

The total value of capital on Manitoba farms in 1999 was almost $13.9 billion. This included over $9 billion in land and buildings, $3.4 billion for machinery and equipment and $1.5 billion for livestock and poultry. Most of the growth has been investment in livestock, reflected by the growth of the hog sector.

Total outstanding farm debt in 1999 was $3.5 billion, with about 45 percent of this debt owed to chartered banks. The most recent available data (1997) indicates that Manitoba farmers have average farm assets of about $716,500, liabilities of $123,900 and a net worth of $592,600. This translates into an equity-to-asset ratio of 83 percent.

Farm Income

Ever-increasing production costs, dependence on unpredictable weather and fluctuating commodity prices make farming a risky business. Figure 2.1 illustrates the extremely variable nature of net farm incomes. By way of comparison, in 1996 the average net income per farm was $22,100 (the best in the last decade) and the average net income of industrial workers was $24,800; in 1999, net income per farm had plummeted to $8,300 while the industrial worker's net income had risen to $26,100. For this reason, federal and provincial governments have cooperated in providing a variety of safety net programs to moderate the fluctuations in farm income.

While gross farm cash receipts and farm operating expenses have risen at a relatively steady rate over the last 30 years as shown in Figure 2.2, the stark reality facing the farm sector in Manitoba is that realized net farm income has been relatively static over time with no discernable upward trend, only year to year fluctuations.

Figures 2.3 and 2.4 illustrate the changing economic nature of Manitoba's agriculture. With respect to changes in source of farm receipts between 1991 and 1999, crop receipts increased about 40 percent while livestock receipts increased over 70 percent. This growth in livestock receipts reflects the recent expansion of the hog sector.

FIGURE 2.1
Total Net Income per Farm in Manitoba

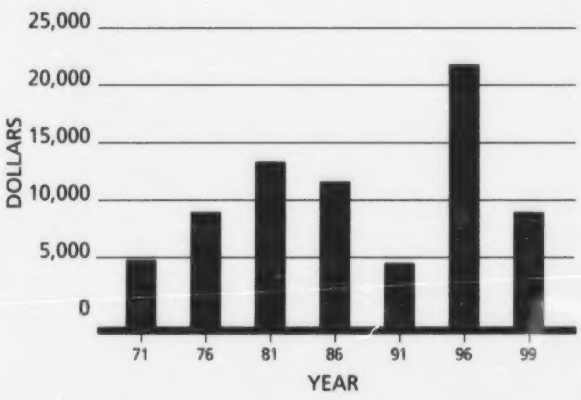
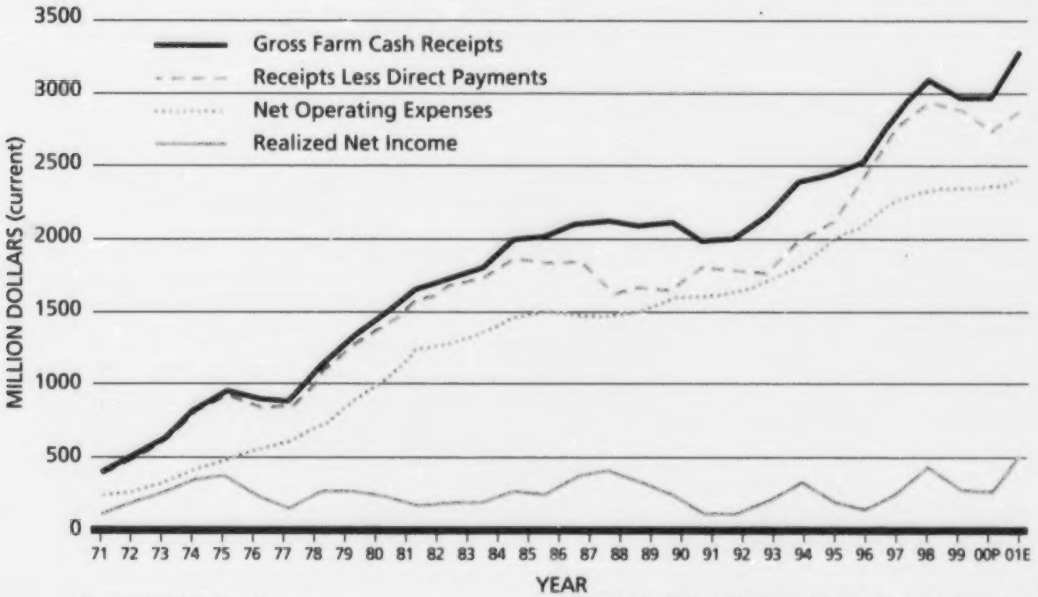


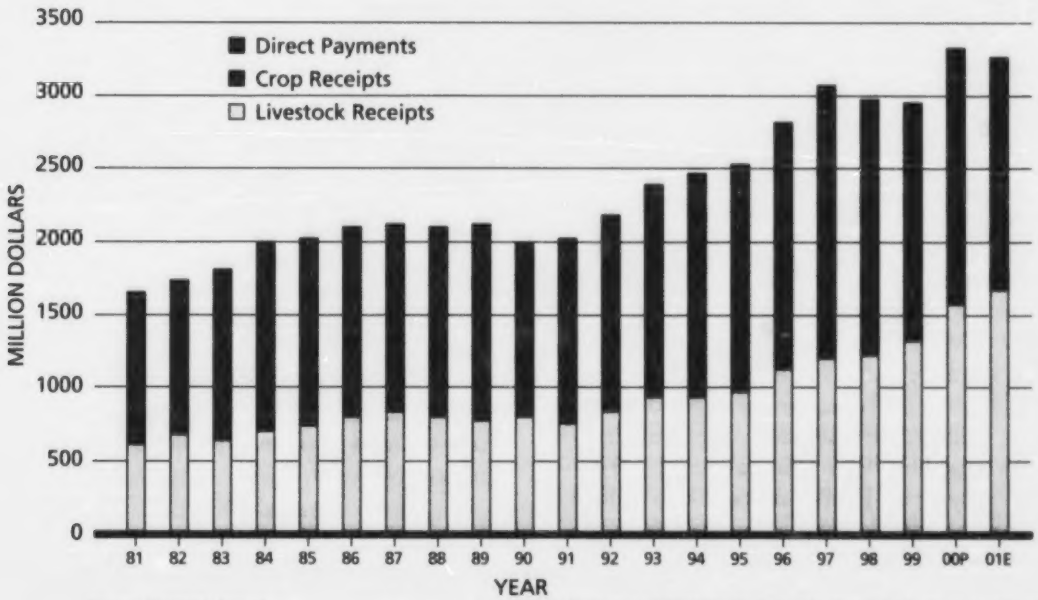
FIGURE 2.2
Farm Income and Expenses
1971 - 2001



Source: Statistics Canada

Market Analysis and Statistics Section, Manitoba Agriculture

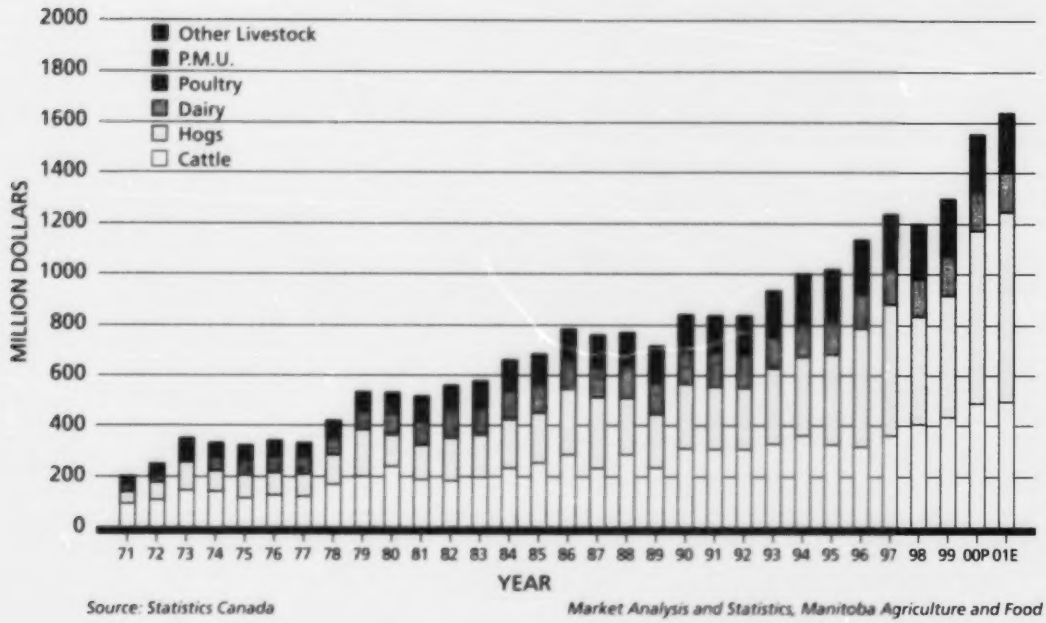
FIGURE 2.3
Farm Cash Receipts by Type in Manitoba
1981 - 2001



Source: Statistics Canada

Market Analysis and Statistics Section, Manitoba Agriculture and Food

FIGURE 2.4
Value of Manitoba Livestock Production
1971 - 2001



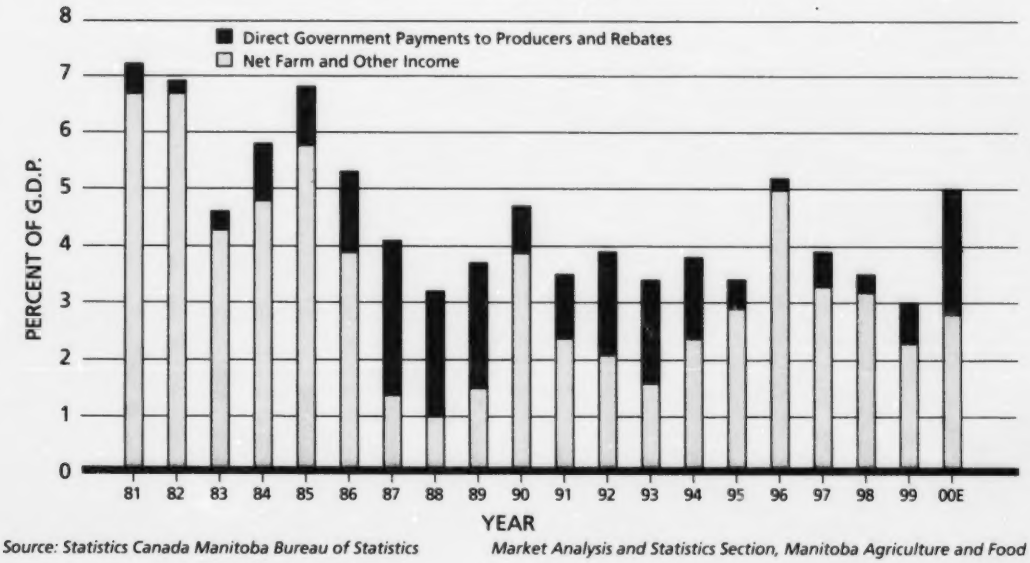
Source: Statistics Canada *Market Analysis and Statistics, Manitoba Agriculture and Food*

Contribution of Agriculture to the Provincial Economy

Agriculture is an important sector in the Manitoba economy. Between 1995 and 1999, agriculture and its related industries contributed, on average, about 11 percent to the provincial Gross Domestic Product (GDP), or almost one dollar of every ten in the economy. Each dollar of gross farm income generated almost two dollars in the economy. In terms of jobs, one in every ten in the province depends on the agriculture industry. In 1999, 37,100 people were directly employed by the agriculture industry and a further 20,400 were employed in areas of the economy dependent on agriculture. Agriculture's direct contribution to GDP is highly variable from year-to-year (Figure 2.5). In 1999 it was only three percent due to low net farm incomes, while three years earlier, in 1996, it was five percent.

The food and beverage processing industry, which includes the slaughter and processing of meat and poultry, fruit and vegetables, cereal products, seed, dairy products, vegetable oils, feed, and beverages, produced an estimated $2.8 billion of goods and services in 1999 or about 25 percent of the total manufacturing output in the province. The largest sector in Manitoba's food and beverage processing industry is the meat and poultry slaughtering and processing sector, which employs over 2,800 people and produces approximately $700 million of meat products. Clearly, agriculture and related processing activities are key to Manitoba's economic future. The challenge is to ensure that this economic future is also environmentally and socially sustainable.

FIGURE 2.5
Contribution of Primary Agriculture to Manitoba G.D.P.
1981 - 2000



Source: Statistics Canada Manitoba Bureau of Statistics *Market Analysis and Statistics Section, Manitoba Agriculture and Food*

Perspective on Livestock Sector Development

Current Livestock Situation

The Panel has chosen to focus only on hogs and cattle in this report, as we believe that these are the major sectors with potential for expansion in the future. In our view, any significant expansion in poultry (with the possible exception of eggs) and dairy is unlikely in Manitoba under current national supply management programs. A more detailed analysis of the economic potential for hogs, cattle, and poultry is presented in the separate technical report.

Cattle

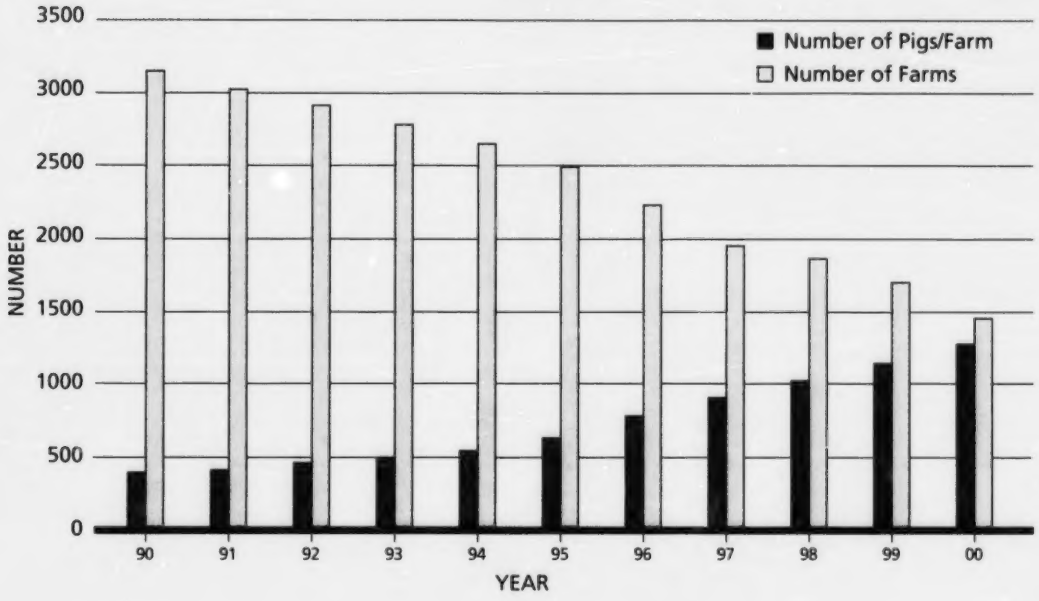
After Alberta and Saskatchewan, Manitoba has Canada's third largest beef cow herd. Manitoba's cattle industry is 95 percent commercial cow-calf operations with the balance being commercial feedlots. A large portion of the cattle raised in Manitoba is sold to Alberta and Ontario as feeder cattle and calves for further finishing prior to slaughter. Manitoba Agriculture and Food has estimated that the province's 12,000 beef cattle producers marketed over 500,000 head for slaughter for sale outside Manitoba.

Since Manitoba has only two small federally-inspected plants and 29 provincially-inspected plants, it slaughters a minimal number of cattle. Manitoba will likely continue to be primarily in the cow-calf and feedlot business. State-of-the art facilities located in Alberta have the capability of processing all the slaughter cattle raised in Western Canada.

Hogs

Between 1990 and 2000, the number of hog farms in Manitoba has declined by more than 50 percent from 3,150 to 1,450, while the average number of hogs per farm has more than tripled - increasing from 388 head to 1,290 head (Figure 2.6). This intensification in the hog sector, and its concentration in certain locations within the province, has heightened public concerns regarding the environment (air and water quality) and public health. At the same time, the rapid decline in the number of small and medium hog farms has also become a matter of social concern.

FIGURE 2.6
Average Number of Pig/Farm and Number of Farms in Manitoba
1990 - 2000



Total hog production in Manitoba has increased from 3.2 million hogs in 1996 to 4.8 million in 1999. Manitoba Agriculture and Food estimates that about 13 percent of commercial hog operations produce weanlings only, 40 percent are farrow-to-finish operations and 47 percent are feeder operations. In 1999, Manitoba exported over 2.2 million live hogs to the United States. Approximately 60 percent of these were weanlings. Manitoba slaughter volumes have increased from 1.9 million head in 1996 to 3.1 million head in 1999. About 515,000 of the pigs slaughtered in Manitoba came from Alberta, Saskatchewan and Ontario.

Manitobans consume only about 11 percent of the pork produced in the province. Pork exports in 1999 of 88 million kg valued at $240 million were made to over twenty-three countries, led by the United States and Japan.

Currently approximately 80,000 hogs are slaughtered weekly in Manitoba. About 45,000 of these are processed at the new Maple Leaf plant in Brandon. This plant has been designed to process 90,000 hogs per week when it operates with two shifts. If Schneiders follows through with its planned expansion in Winnipeg to 90,000 hogs per week, this will give Manitoba a potential capability to process 10 million hogs per year.

Factors Affecting the Growth in Livestock Numbers in Manitoba

A number of factors have encouraged the expansion of the livestock industry, especially hogs, in Manitoba over the last decade. In summary, these factors include:

- changes in world grain trade resulting in relatively static volumes of grains being sold at ever declining prices (constant dollars) due to technology improvements;
- loss of the Crow Benefit on export grain resulting in farmers facing the full freight bill and lower (at least initially) feed grain prices;
- growth in world demand for meat due to rising incomes;

- desire by producers to diversify their production base and thus reduce risk and fluctuations in farm income;
- government programs encouraging rural diversification;
- improved animal genetics and production technologies;
- integration of various components in the supply chain to reduce costs, share the risks and improve profits, and
- concerted effort by the Government of Manitoba to expand hog processing capacity in Manitoba.

Future Prospects for Expansion of Manitoba's Hog Sector

Major restructuring has occurred in the slaughter and processing industry with on-going development of vertical integration and strong linkages between producer and consumer throughout North America. In the United States, four firms control over 60 percent of the daily kill capacity. In Canada, the top four processors accounted for 68 percent of the average daily hog slaughter in 2000 compared to 51 percent in 1993. This concentration in the industry has developed because economies of scale are now dictating that plants are able to slaughter four million hogs annually based on a double shift operation.

In 1996, the Government of Manitoba eliminated mandatory marketing of hogs through a marketing board and allowed producers to sell hogs directly to packers. Direct contracting with producers in Manitoba has permitted established facilities to guarantee a certain percentage of their daily slaughter requirements. It has also resulted in processors developing affiliations with others in the supply chain to ensure production of the type and quality of hogs desired for specific markets. However, smaller hog producers appear to have more difficulty with direct selling to packers.

As indicated earlier, Manitoba slaughtered 3.1 million hogs in 1999, with about 515,000 of this total coming from Alberta, Saskatchewan and Ontario. Since the establishment of the Maple Leaf plant in Brandon in 1999, the current provincial slaughter capacity has increased to approximately 6 million hogs annually. Manitoba's production is currently less than 5 million hogs. Packing plants (even if they were able to buy all locally grown hogs) will still have to rely on more production from other provinces to offset the shortfall, or else operate at less than full capacity.

Manitoba hog producers also exported 2.2 million live hogs to the United States in 1999, approximately 60 percent of which were weanling pigs sold to feeder operations located in Iowa, Minnesota, Nebraska and South Dakota. Large portions of these sales to US grower-finisher operations were under contract. As well, some slaughter hog exports went directly to packing plants in South Dakota, North Dakota, Iowa and Wisconsin. Farmers with slaughter hogs typically want to diversify their sales to avoid one or two buyers dictating market prices. For this reason, many analysts and industry observers believe that the flow of live hogs to the United States will continue, perhaps in smaller numbers, despite expansion of the packing industry in Manitoba. A current production shortfall of two to three million hogs to meet existing hog processing capacity in Manitoba has to be a major consideration in further expansion of hog processing and production in this province.

To increase production by three million hogs beyond the current level would require an additional investment of about $750 million in barns, equipment, breeding stock and land. Assuming that hog producers can obtain an adequate return on their investment, this level of capitalization can likely be found. There are other challenges, however. The availability of appropriately trained labor to work in barns has been identified as a current constraint. The problem of local barley being infested with fusarium has necessitated the import of "clean" barley from Saskatchewan and Alberta, adding to the cost of feed. The recently imposed import tariff on US corn coming into Manitoba will also bring about some increase in local feed prices. The

duration and intensity of these factors will certainly influence the speed and extent of hog production expansion in Manitoba.

Not to be forgotten are public pressures opposing hog expansion, an issue which will be discussed later in this report.

Historical Perspective on Livestock and the Environment

Earlier Reviews

Concerns about livestock production and its impact on the environment have deep roots in Manitoba. In the late 1970s, the government of the day requested that the Clean Environment Commission (CEC) conduct an investigation to determine the pollution problems associated with intensive livestock operations with the objective of developing guidelines and regulations to address these concerns.

At the time the Commission undertook its study, there were a number of pieces of legislation affecting livestock operations, including *The Public Health Act, The Clean Environment Act* and its regulations focusing on water quality, *The Nuisance Act,* The Planning Act and provincial land use policies. This array of policies and legislation resulted in confusion and, sometimes, inconsistent application among municipalities. The general public was also concerned about the impact livestock production was having on the environment. This was reflected in the fact that approximately 75 percent of complaints received by environmental control authorities in the late 1970s were related to odors emanating from livestock operations.

In the *Report on an Investigation of Intensive Livestock Production Operations in Manitoba,* the Commission stated that odors were nuisances but were not a risk to human health. It was generally recognized that no effective technologies existed to completely reduce odor emissions other than to use policies to ensure good management practices and to maintain minimum separation distances between the livestock operation and nearby residences. Measurement of odors was difficult because available apparatuses recorded different readings depending on who operated the equipment.

The Commission therefore concluded that land use planning and zoning were the only practical measures to address odor complaints. Intensive livestock operations (ILOs) would be obliged to maintain a minimum distance from residential areas and, similarly, residential areas were prohibited from encroaching on existing farming operations.

Given the variation in definitions and the array of legislation and regulations, the CEC suggested a consolidation of the legislation and regulations into one piece of legislation. The CEC further recommended that regulations relating to livestock operations under *The Clean Environment Act* be revised and the regulations under *The Public Health Act* be rescinded. Existing operations were to be given a five-year period to comply but had to file a plan for compliance with the Department of Mines, Natural Resources and Environment. The proposed revised regulations clarified the definition of an ILO and required that any operation over 300 animal units (AUs) be registered with the department and file a proposal detailing plans of their operation. The report encouraged municipalities to form planning districts and to identify zones around urban areas where limited agricultural activities could occur. Until municipal land plans could be developed, *The Clean Environment Act* stipulated the minimum separation distances for municipalities to use.

Guidelines were also suggested as a means to provide producers with information on best management practices. The Commission also said that the Departments of Agriculture and Mines, Natural Resources and the Environment along with any other appropriate departments, should develop these guidelines. They also suggested a set of development guidelines be available to help municipalities adopt land use plans.

The Commission realized that it was essential to have maps detailing areas sensitive to groundwater pollution based on soil types, soil moisture and

groundwater aquifer locations. Site-specific soil and groundwater studies were also suggested to assess the risk of groundwater pollution from any proposed intensive livestock operation. Manure storage was considered a preventative measure to avoid groundwater contamination. The report also suggested that manure should be distributed on the land, incorporated quickly and used by a crop within 30 months. Monitoring of groundwater would be essential to identify any contamination.

In 1993, the Government of Manitoba established the Manitoba Pork Study Committee with the purpose of determining the opportunities for growth in Manitoba's pork industry and establishing what actions needed to be taken by the various stakeholders to ensure the growth occurred. Although largely focused on economic growth, the report entitled, *Manitoba's Pork Industry: Building for the 21st Century – Prospects and Challenges,* made a number of recommendations aimed at sustainable hog development in Manitoba. These included:

- the public be made more aware of the economic benefits of the pork industry and that information include details on hog manure management and the regulations that farm operators must meet;
- regional technical committees evaluate new site locations and plans and that regional committees or independent professionals be used to evaluate complaints;
- there must be consistency in land use regulations across all jurisdictions;
- an independent livestock operations review panel be established to consider land use issues when requested by a municipality or a hog producer;
- land use remain under the jurisdiction of the municipalities;
- environmental liability is an important issue for financial institutions and must be addressed. Consideration could be given to an environmental insurance or industry contingency fund;
- municipal councilors require more information, support and an enhanced education program to assist them in evaluating hog expansion plans;
- guidelines and regulations must reflect the latest technologies and be applied to new developments, and
- research and development of new by-product management systems should be encouraged.

Although the Manitoba Government has long advocated the development of the livestock industry, while at the same time ensuring the integrity of the environment, it is apparent that progress since the 1979 CEC report has been slow. While the Pork Industry Study did generate some debate initially, its report has essentially been ignored by government. In fairness, progress tends to be very difficult since the process must adequately address and balance both the environmental risks and the potential economic benefits of hog production for all Manitobans. Key to this is an assurance that standards are being met, monitored and enforced.

Current Environmental Regulations

Current legislation and regulations include the control of the siting of livestock operations through permits issued by the municipality or planning district. *The Planning Act* allows for voluntary land use planning at the local government level. As of September 2000, local planning authorities represented 184 of the 201 municipalities. In addition, five municipalities are actively discussing the formation of planning districts. The remaining 12 municipalities have no district plan and therefore no legal authority to regulate siting and development of proposed intensive livestock operations. ILOs built in areas with no local land use planning authority simply require the appropriate permits from Manitoba Conservation regarding manure storage design and construction and a water rights license. In summary, municipalities have adopted a wide variety of development policies and zoning standards to address the issue of intensive livestock operations. Some municipalities have

more stringent controls; others permit almost all operations in agricultural areas. The result, as the Panel has been told, has been little consistency among municipal jurisdictions.

The province provides technical assistance to help planning authorities evaluate proposed ILOs. Through its regional Technical Review Committees (TRCs), proposals are evaluated based on local and provincial land use policies and zoning, the Farm Practices Guidelines, the Livestock Manure and Mortalities Management Regulations and any other appropriate information such as local well logs, soil survey maps, hydrogeological studies and engineering standards. A TRC is ordinarily made up of government-appointed staff with appropriate specialist knowledge from provincial Departments of Agriculture and Food, Conservation, and Intergovernmental Affairs. Recent amendments to *The Planning Act* would make a review by the TRC mandatory whenever a municipality receives a conditional use application related to an ILO.

The Farm Practices Guidelines have been developed with input from a broad cross-section of industry, academics, provincial specialists and consumer groups. These guidelines are intended to identify normal practices to help individuals evaluate their operations and to assist in dispute resolution under *The Farm Practices Protection Act*. They include technical information on siting of operations, odor control, manure storage planning, manure storage types, pollution prevention relating to water and soil, and dead animal disposal.

The Environment Act through the Livestock Manure and Mortalities Management Regulation addresses issues involving livestock manure storage, spreading and hauling. It also regulates the disposal of dead animals. Operators proposing to construct or modify a manure storage facility are required to obtain a permit to ensure that the facility has been designed and properly sited by a qualified professional. Operations with more than 400 AUs of any one species are required to register manure management plans annually. Manure management plans are intended to ensure that application rates recognize crop needs and that adequate land is available for spreading the manure. Restrictions apply to maintain water quality in watercourses, wells, springs and sinkholes. Operations using more than 25,000 litres of water per day must obtain a license under *The Water Rights Act*. The licensing process includes a hydrogeological assessment of the surface water and groundwater capacity to supply the volume of water required and the potential impact on existing uses of these water sources.

A more detailed description of Manitoba's current regulations and guidelines for livestock development is found in *Livestock Stewardship 2000: A Public Discussion Paper*. A summary of the regulations in other Canadian provinces can be found in the separate technical report. Compared to other jurisdictions in Canada, Manitoba's regulations and procedures appear to be of an adequate standard, although improvements are certainly possible. The overriding issue appears to be the monitoring and enforcing of these standards.

CHAPTER 3

PRINCIPLES FOR SUSTAINABLE LIVESTOCK DEVELOPMENT

In the view of the Panel, sustainable livestock development consists of three interrelated key components: economic viability, environmental stewardship, and social and equity issues. This can best be illustrated with Figure 3.1 that has the three components shown as circles that intersect. Our challenge, indeed the challenge for everyone with an interest in the livestock sector, is to identify policies, guidelines and regulations that will enable us to expand Manitoba's livestock sector in ways that take account of the concerns in all three circles. Solutions that deal with only one of these components and don't recognize the others simply won't be acceptable to Manitobans.

Figure 3.1
Concept of Sustainable Livestock Development

The concept of sustainable livestock development requires an identification of principles. Drawing on a set of principles for sustainable agriculture developed by the International Institute for Sustainable Development, the Panel has identified a number that have guided its analysis of the issues and the preparation of its recommendations.

- Economic, environmental and social considerations must be integrated in public and private decision-making.
- The concept of stewardship is paramount, that is, today's decisions must be balanced with tomorrow's impacts.
- The long term productive capacity and quality of our natural resources must be maintained.
- Economic returns from production should enable an adequate standard of living to be maintained; furthermore, it should be sufficient to continue to attract replacement farmers.
- Economic activity should not detract from human health or the quality of land and water; a balance must be struck between the size of production units consistent with technology and a social structure acceptable to all stakeholders.
- Science based information must be an integral part of public and private decision-making. Where that information is inadequate, government and the private sector have a responsibility to support appropriate research activities.
- Means to ensure that the results of the research are effectively communicated to farmers and decision-makers also are necessary.
- Adequate resources must be allocated to monitor and enforce compliance with regulations and standards.
- There must be sufficient transparency to stakeholders in the production, processing, and regulation of the livestock industry to instill confidence that Manitoba's food is being produced in a safe and sustainable manner.

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CHAPTER 4

SUMMARY OF LIVESTOCK STEWARDSHIP PUBLIC MEETINGS

It was the Panel's belief that a carefully conducted public consultation process was essential to obtaining input from all stakeholders. There was a great deal of interest shown in the Panel's work, and many organizations and individuals made their points in a thoughtful and, on occasion, forceful manner. In total, 226 presentations were heard over the ten days (60 hours) of public hearings in six different locations (see Table 4.1). Attendance at the meetings ranged from 40 people in Dauphin to over 500 in Steinbach.

In order to accommodate everyone who wished to make a presentation, presenters were given ten to fifteen minutes to succinctly elaborate on the major points of their submission. They were invited to submit additional material, especially in response to questions from the Panel. The Panel received over 150 written submissions – some from presenters with follow-up information, but many from individuals who did not make oral presentations

After the public presentations, the Panel had a number of follow-up meetings with a number of organizations to seek further clarification on key issues. The Panel was very pleased with the response to the public consultation process and gratefully acknowledges the efforts and commitment of all who participated in the process.

What follows is a summary of key points made at each of the six locations. No attempt was made to "rank" the issues by the number of times they were mentioned. However, at the end of this chapter the Panel does make a judgment as to which issues required further attention.

Table 4.1
Panel's Public Consultation

Location	*Date(s)*	*Number of presentations*
Morden	June 29	16
Arborg	July 5	29
Brandon	July 11 & 12	36
Dauphin	July 13	11
Winnipeg	July 24, 25 & 26	66
Steinbach	July 31 & August 1	68
Total locations 6	***10 days of consultations***	***226 presentations***

Morden

A. Evaluating Proposals

- One should only require a conditional use permit if the livestock operation proposes to operate beyond the provincial guidelines.
- Consistency is important in assessments. Science should be the basis of any assessment.
- Public access to information and input on the application is important.
- It is just as important to have an appeal process. Some felt that it should be beyond the RM level to ensure local politics do not affect appeal outcomes.
- Most presentations indicated that current regulations are acceptable but that monitoring and enforcement of these regulations are inadequate.

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B. Environmental Monitoring

- There is an inconsistency among RM zoning regulations. This requires a provincial standard to be established. Provincial leadership and enforcement will also help deal with inter-municipal issues. Larger planning districts will allow one to consider the cumulative effects and downstream impacts.
- Stricter enforcement is required with more monitoring. This will require increased commitment by government with more dollars and staff. Some expressed the view that an independent third party to enforce regulations would be the best solution.
- The TRC has a valuable role to play. The CEC could also hold hearings on livestock operations. The more information available, the better informed will be the decision-maker.
- It is necessary to consider the costs associated with the rules. Some felt that it would not be unreasonable to have different rules apply to different sizes of operations. Others felt that the small operations can pollute just as much and perhaps are disadvantaged by not using the most modern technology.
- Odor is a problem that requires further research to determine acceptable levels. A mechanism to measure, monitor, and enforce standards is also needed.
- Nutrient management should include anhydrous products.
- Producers must be educated on the need to realize that manure is a resource.
- In terms of water quality, concern was expressed about the impact of livestock operations on nearby wells. It was proposed that test wells be used to monitor impacts and that the government offer free testing of rural wells. Capping of abandoned wells was also a recognized as requirement.

C. Property Values & Property Taxes

- Perhaps residential uses should require conditional use permits rather than farming operations.
- Property tax should consider the intensity of the farming operation not just land base.
- Hog barns provide a good tax base for municipalities.

D. Other Issues

- There is a need to adopt more natural methods of production.
- The public should be educated on livestock operations and agriculture.
- Citizens moving to rural areas must consider that some issues are just related to general agricultural practices.

Arborg

A. Evaluating Proposals

- There needs to be far more consistency in assessing applications among the RMs. Having a larger body (e.g. beyond RM level) review the application would eliminate some of the local politics but could also eliminate the sensitivity to community issues. Larger planning districts would encourage harmony between operators and rural residents. TRC review should be mandatory. Some stated the TRC report should be presented in person to a public meeting.
- Some felt the same regulations should apply regardless of farm size.
- The Provincial Land Use Committee of Cabinet should take a more active role.
- Large farms should be required to undertake an environmental assessment
- Some felt that the rules should be more flexible relative to site topography.

- When a conditional use application is rejected, a written decision outlining in detail the reasons for the rejection should be provided.
- An appeal process should exist.

B. Environmental Monitoring

- Enforcement tends to be limited, and level of fines inadequate. In general, all those who commented on this thought that fines should be increased.
- Some stated they should be related to the size of the operation. Increased inspection, consistency in applying regulations and more transparency are essential.
- Municipalities lack the resources to enforce. A larger body must do the monitoring and enforcement.
- Others advocated self-regulation with support of a mediator.
- Assistance in the form of dollars, tax-free loans and information should be provided to small farmers to allow them to upgrade their operations.
- One must recognize that the problem goes beyond agriculture and should consider municipal sewage systems. All lagoons should be certified.
- To reduce odors, use of covers and using injection only should be required. The owner should live next to his barn.
- Water testing of wells should be free and abandoned wells should be sealed.
- Regulations should be developed to deal with the quality of the water in Lake Winnipeg. Aquifer degradation is also a concern and should be monitored.
- There is a need to balance manure applied and crop up-take. Manure should be recognized as a valuable resource with organic matter.
- The manure from hogs when applied to the soil provides the important nutrients and organic matter for the crops used in hog feed.
- Some felt that changing farming practices to less liquid and more straw would help the situation. Others wanted diking of manure spread fields to avoid run-off.
- One suggestion was to develop a map of manure and slurry disposal sites.
- Investor/owner liability for damages was viewed as necessary.
- Farmer education of the regulations/obligations is necessary. This could also be used to inform them of practices that could reduce neighbor complaints (e.g. manure spreading at different times).
- Forcing owners to reside on the land would help in odor management.

C. Property Values & Property Taxes

- We should designate farm zones where barns can be concentrated. Freedom from changes in zoning should also be provided. Some felt that residential and livestock zones within each RM should be identified.
- There should be research done on the impact of intensive livestock operations on property values. Some stated that this should be extended to include the impact of sub-divisions on land values.

D. Overall Economic Impact

- Growth in farm size is natural as economics drives the process.
- ILOs tend to be more environmentally sound as they have the financial resources to install the latest technology.
- The expanding livestock sector has had a major positive impact on the local economies of the Interlake communities. It has reversed the depopulation trend of some rural areas and encouraged agricultural diversification.

E. Farm Ownership

- There is a need to allow processors to own pig operations, as this would ensure more sustainable operations.
- There should be special provisions for new generation co-operatives versus vertically integrated operations.

F. Other Issues

- There is a need to educate the public about ILOs, their impact on the local economy and the spin-offs realized by urban centres.
- Larger barns mean larger dollar losses associated with fires, which results in increased premiums for all intensive livestock operations.

Brandon

A. Evaluating Proposals

- Some viewed TRC as "pro" hog development. Others felt the TRC has an important role to play and should review all applications with their decision being binding on the RMs.
- Environmental assessments should be done across a number of RMs or on a planning district basis.
- Science should guide the siting of ILOs.
- Regulations should consider the risk associated with the proposal.
- The decision-making time should be extended to 60 days to allow for sufficient public input.
- Written reasons for rejection of an application should be provided. An appeal body is required.
- The threshold size of operation (400 AU) is too high. Some felt it should be reduced to 300 AU, some felt it should be cumulative not species oriented; others felt that the same standards should apply to all operations.
- The application process should include not only new operations but also expanding operations.
- Restrict the total number of animal units in the watershed.

B. Environmental Monitoring

- There is a lack of enforcement. Results of any enforcement done are typically not made known to the RM, farmer or public to let them know of the job being done.
- Some felt peer monitoring and assistance would do the job.
- Performance bonds are necessary.
- Environmental clean-up costs should be the responsibility of the farmer.
- The principle of grandfathering operations should be considered in the event of changes in regulations.
- Incentives and assistance should be provided to small operators to allow them to meet the standards.
- Increase funding for water quality monitoring. Install monitoring wells near ILO sites.
- Odor issues should be referred to Farm Practices Board, as this is a management issue. Practices such as having barns three miles from residences, venting barns vertically and covering manure storage should be necessary for large operations.
- A scientific conference on intensive livestock operations should be convened.
- More money needs to be invested in manure management research including showcasing innovative practices. One key area of study is the potential for phosphorus build up in the soil.
- Promote the use of manure on forages. Manure applied to fields provides important nutrients needed by crops.
- Regulations should differentiate between solid and liquid manure systems.

C. Property Values and Property Taxes

- Designate land areas within the RM for the exclusive location of ILOs.
- Large barns should be taxed like a commercial industry and be subject to the same regulations (e.g. fire codes).
- Farming caveat should be allowed on properties. Currently, Land Titles does not recognize this. Could also allow odor caveats.
- There should be a buffer zone around towns.

D. Overall Economic Impact

- Large barns create few jobs because of the degree of automation. They also don't buy locally.
- Livestock operations are a viable alternative to farm diversification. Too many regulations will hamper future development of the industry.
- Agriculture is a key component of the provincial economy and the livestock expansion is a major economic opportunity. It has a significant impact on the service sector in rural communities.
- Larger operations can afford the costs of compliance.

E. Health – Farmer, Worker, General Public

- Study the impact of microbes, micronutrients and antibiotics in manure on human health.

F. Farm Ownership

- New generation hog barns are more acceptable.

G. Labor

- Large barns should be required to operate under the same labor codes as industry. Allowing hired workers to be hired under The Farm Labor Act results in subsidized labor.
- Livestock operations need to be big enough to allow farmers to hire staff so they can take vacations.

Dauphin

A. Evaluating Proposals

- Some felt that municipalities should not have standards higher than the province.
- Educate municipal councilors on legislation, regulation and procedures.
- 400 (AUs) is a reasonable size to define large versus small operations.

B. Environmental Monitoring

- There is a lack of enforcement and monitoring of existing regulations.
- Performance bonds are necessary.
- Nutrient management plans that consider manure and anhydrous fertilizers are essential.

C. Property Values and Property Taxes

- Agriculture should have priority over other uses. Protect livestock farms from encroachment of urban sprawl. Restrict "urbanization" by insisting on conditional use permits for housing.

D. Overall Economic Impact

- Technology tends to drive the size of existing hog operations.
- Livestock expansion has provided new markets for Manitoba crops and has helped offset some input costs by allowing manure to be used instead of buying fertilizer.

E. Farm Ownership

- New generation hog barns are more acceptable.

F. Labor

- People who work in large barns are not farmers.

Winnipeg

A. Evaluating Proposals

- There is a need to have planning districts larger than the RM. Incentives should be provided to encourage RMs to get larger.
- Some municipalities have enacted tighter standards.
- Construction should be prohibited unless provincially approved. TRCs should be independent and their reviews mandatory for all ILOs but the RM should have the final decision.
- The size of operation should cumulate AUs across species.
- Public input should be encouraged.
- Written reasons for rejection should be provided along with a mechanism for appeal or re-application.
- The RMs should phase in a geographic information system (GIS) system with the applicant paying cost recovery.
- Develop a database of inventories of livestock operations.
- Many felt the current regulations were adequate but that enforcement was needed.

B. Environmental Monitoring

- The regulations are good. Enforcement and compliance is lacking. Penalties are too minimal and should be based on the size of the operation. The system should shift from a complaint-based, reactive approach to a proactive approach with comprehensive, routine testing.
- More well testing is required. Each residence should have two free tests per year with even more if they live near an ILO. Abandoned wells should be sealed.
- There should be performance bonds to pay for clean-ups and recourse for monetary compensation.
- TIP line for complaints and a one-stop place for the farmer to seek help on particular problems.
- Nutrient management plans including manure and commercial fertilizer should be required.
- Train and license custom manure applicators.
- Promote the use of manure on forages. There can be a positive interaction between the hog and beef sectors by applying hog manure to forages.
- Identify sources of phosphate pollution.
- Measure emissions to regulate odors.
- Incentives should be provided to encourage the adoption of new technologies that are compatible with our trade obligations.
- Riparian areas should require fencing.
- Biogas generation needs to be re-examined.
- We should periodically sample our waterways to assess impacts.
- Stricter regulations are required for municipal lagoons.

C. Property Values and Property Taxes

- Transfer approval for livestock usage with the land.
- Repeal *Farm Practices Act* to allow for provision for compensation of other residents.
- Update *The Land Use Act*.
- Undertake a study of the impact of ILOs on property values.

D. Overall Economic Impact

- Manitoba is suited to intensive livestock. Marketing boards should be eliminated to allow expansion of the poultry industry.

- ILOs have increased demand for grain and helped the grains sector.
- The expansion in livestock is critical for many rural communities if they are to survive economically and socially.

E. Health - Farmer, Worker, General Public

- Undertake studies on public health associated with ILOs.
- Need to study the impact of nitrates and pathogens on water.

F. Farm Ownership

- Should have anti-corporate farm legislation. The number of off-site investors could define a corporate farm.

G. Labor

- Small operators have difficulty in getting relief workers. This tends to promote larger operations. Farm families want a lifestyle similar to their urban counterparts, including vacations. Farm operations need to be big enough to afford hired labor.
- Need to bring farm workers and managers under labor legislation.

H. Animal Welfare

- Concern about crate confinement of pregnant sows. A viable alternative is required.
- Improve dead animal disposal.

I. Other Issues

- There has been a loss of price transparency for hog sales. Many marketers and dealers are not bonded or licensed, leaving the producer with limited recourse for non-payment.
- Need a comprehensive program with a public information component. This should include information on changes in agriculture.
- Production and processing of 10 million hogs will never be reached because of a wide range of other factors.

Steinbach

A. Evaluating Proposals

- TRCs should solicit public input and play a greater role in public education.
- TRCs could involve citizen participation, Keystone Agricultural Producers and staff from RM.
- Need for scientific based decisions. Apply fairly and let the public know
- Reduce trigger point for AU and make it cumulative.
- Often the first application is for the best site. Rejection can mean selecting a less appropriate site for future applications.
- Some RMs have different AU standards that are less than the 400 AU limit. They routinely add amendments as they see fit.

B. Environmental Monitoring

- Straw covers on manure storage eliminate odors.
- Need more staff for monitoring, more accountability and more research.
- Should not "grandfather" operations.
- Need nutrient management plans to consider the impact of fertilizers.
- End clay lagoons.
- Provide incentives to bring existing farms up to standards through tax write-offs.
- Encourage mediation and a cooling off period.
- TIP line for violators.

C. Property Values and Property Taxes

- Local land values have not dropped.
- Concern expressed over the urbanization of farmland.
- Repeal *Farm Practices Act* to allow for suing farmers.
- Caveats should be placed on land to be designated for livestock.
- Inconsistent treatment of property taxes for land-intensive versus livestock-intensive operations.

D. Overall Economic Impact

- ILOs increase farm income and creates local jobs.
- Many farmers in their presentations indicated that raising hogs has meant the difference between farming and not farming.
- Several agribusinesses talked about the positive impact the boom in livestock operations has had on their businesses.

E. Health - Farmer, Worker, General Public

- Study the impacts of antibiotics on humans.
- Canadian Quality Assurance program and separated hog sites have reduced the need for drug usage.

F. Labor

- Need to determine the illness and injury rate in hog operations compared to other industries.
- Full labor rights to farm workers.

G. Animal Welfare

- Phase out gestation crates by 2010. A viable replacement is required.

H. Other Issues

- Educate the public on agriculture.
- Designate Rural Economic Development Initiative (REDI) funds for ILO infrastructure.

Summary and Next Steps

A wealth of information and strongly held opinions (both on occasion conflicting) were presented during the Panel's public consultations. In spite of the efforts of many people, the summary in this chapter cannot do full justice to the wide range of views. After reviewing the oral presentations and the written submissions, the Panel concluded that a number of key issues required further analysis. These were:

- Planning for sustainable livestock development at the provincial and local levels.
- Environmental and health concerns, including water quality, air quality, and climate change.
- Management issues, manure management, swine housing, and riparian management.
- Socio-economic issues.
- Information and monitoring systems and research.

To get a better understanding of the scientific underpinnings of some of these issues, the Panel convened four research roundtables at the end of August to further explore issues of water quality, air quality, manure management, and monitoring and information systems. Scientists and practitioners knowledgeable in these matters were invited to meet with the Panel for further discussions. Dr Ross Bulley served as a scientific advisor to the Panel during these roundtables.

The Panel met with a wide range of provincial and federal officials, university and industry researchers, producer organizations and public stakeholder groups to enhance our understanding of these issues and explore alternative solutions. These discussions took place in Manitoba,

Saskatchewan, Alberta, Quebec and Ottawa. We sincerely acknowledge the time and effort expended on our behalf by all of these people and organizations.

The range of issues raised far exceeds what could be covered in this report, given time and resource constraints. What follows is the Panel's interpretation and synthesis of what we heard and read. We have endeavored to reach conclusions and make recommendations based on the principles for sustainable livestock development laid out in the previous chapter.

CHAPTER 5

PLANNING FOR SUSTAINABLE LIVESTOCK DEVELOPMENT

Planning, at its best, is the process of seeking effective compromises. It should enhance the likelihood of economic success of a development proposal, ensure that natural resources are used and managed within their capacity to recover, respect human expression upon the landscape and contribute to human well-being

Early in its deliberations, before hearing from the public, the Panel was surprised at the lack of assembled information on the distribution of the livestock industry around the province. Neither the number or location of hog barns, for example, seemed to be mapped against broad geographical characteristics on a province-wide basis, nor could the Panel easily obtain a statistical impression of the density of large barn development. Location maps of current livestock operations, the number of animals and the amount of land associated with each operation rest with the municipalities. There is much to be done to co-ordinate existing geophysical and biological knowledge of Manitoba's natural systems with human development. Provincial and federal departments hold much of the data, but there are many gaps and little coordination. One exception is the geographic information system (GIS) work that the Prairie Farm Rehabilitation Administration (PFRA) is conducting with some Manitoba municipalities.

Government is hard pressed to shape policies for the future while it lacks an overview of the present. At the hearings, the Panel sensed the public's need for reassurance that the livestock industry will be guided carefully in the interest of the health and well-being of Manitobans – that the expansion would be contained within the limits of the province's environment.

Expectations have been raised. Some presenters at the hearings had participated in the Consultation on Sustainable Development Implementation (COSDI) exercise to develop an integrated framework for large area and municipal planning, significant resource allocation, and environmental management decisions to ensure sustainable development in Manitoba. They had read the COSDI REPORT of June 1999, summarizing the recommendations of the "core group" which led the consultative process.

The COSDI Report and Planning at Local and Provincial Levels

The "Principles and Guidelines of Sustainable Development" were brought into law in 1998 to guide the behavior and decision-making of all government departments, agencies and Crown corporations. The COSDI Report recommended the means by which this can be accomplished. Some of these recommendations with relevance to the livestock industry will be addressed here.

The question of which level of government should approve the location of a new intensive livestock operation was of prime concern to many presenters at the hearings. The argument was between the advocates of uniform criteria, dispassionately applied across the province, and those who supported decision-making as close as possible to the proposed development.

Recent changes to The Planning Act prescribe review of each new intensive livestock operation by a Technical Review Committee (TRC), retaining the notion that its findings are a resource to the councilors who are responsible for the siting decision. The TRC's report must be provided to the provincial minister. These changes give some assurance that the local environment will be carefully considered, but the central theme of COSDI is that we need to look beyond the municipal boundaries to the requirements for sustainable development within the natural region. COSDI recommended the "large area plan"

as the vehicle to

> *provide direction and coordination to the activities of planning and conservation districts, regional and community development corporations etc. where applicable, and provide broad guidance and direction as to infrastructure, resource planning and allocation, protected areas, economic and social services, transportation and types of development to be encouraged in the planning area.*

The Panel strongly endorses the notion of sustainable development planning at the large area scale, but recognizes that this is an immense task and not likely soon to catch up with the demands that the expanding industry impose on local government. However, much greater public confidence will flow from signs that this broader picture is not lost in local considerations. For example, a group of scientists encouraged the Panel to make recommendations that would lead to decreasing inputs of chemical substances, especially phosphorus, into Lake Winnipeg, not to maintaining or increasing them. As well, Manitoba Conservation is working on the development of a nutrient management strategy for surface waters in southern Manitoba. The public needs to know that such matters are being considered.

Given the absence of large area plans, it is important to move forward bearing in mind COSDI's advice that Manitoba:

- require municipalities to review existing development plans within a reasonable time period, to:
  - include criteria for acceptability of developments and specify types of development that are considered compatible and incompatible with the local area, and
  - ensure that development plans reflect the components of sustainable development;
- develop criteria, in consultation with municipal governments and the public to assist in the assessment of development plans for sustainability;
- require all municipalities/local governments, which do not currently have development plans, to adopt development plans that reflect the components of sustainable development;
- provide support to municipalities to implement the above;
- encourage municipalities to join together to plan on a district basis;
- encourage district planning boards, conservation district boards and regional or local economic development boards to cooperate and coordinate their activities, and
- require all municipalities and district planning boards to undertake meaningful public reviews of their development plans no less than once every five years.

A factor in the call for a moratorium on expansion of the hog industry by some presenters was a sense of the unpreparedness of governments to deal with the rush of applications. A development plan gives an indication to the public of what would take place in what part of a municipality. It guides a council from one term to another. Completion of such plans for all municipalities should be expedited. Priority should be given to local governments experiencing or likely to experience heavy growth in intensive livestock operations. Development plans should evolve, as COSDI notes, in an interactive process in a community, and the power of The Municipal Act to allow by-laws to be enacted is protective (as in stopping nuisance) and is thus less suited to sound land use planning.

Recommendation:

- **New and expanding ILOs should not be permitted in municipalities lacking land use zoning by-laws until such by-laws have been formally adopted.**

Saskatchewan's approach to ILOs is instructive. Saskatchewan Agriculture and Food shepherds the process through the provincial system, at the same time applying its own tests of the proponent's intentions for manure storage and management. Any project is subject to the province's

environmental assessment. This evaluation asks if the project is likely to:

- have an affect on any unique, rare, or endangered feature of the environment;
- substantially utilize any provincial resource and in doing so pre-empt the use, or potential use, of that resource for any other purpose;
- cause the emission of any pollutants or create by-products, residual or waste products that require handling and disposal in a manner not regulated by any other Act or regulation;
- cause widespread public concern because of potential environmental changes;
- involve a new technology that is concerned with resource utilization and that may induce significant environmental change, or
- have a significant impact on the environment or necessitate a further development that is likely to have a significant impact on the environment.

In effect, each proposal for an ILO in Saskatchewan requires formal approval from both municipal and provincial governments, whereas Manitoba relies upon the TRC to advise the municipal council on the compatibility of the project with the environment, and the municipal council alone makes the final decision.

Proposed New Approval Process for Manitoba

The Panel endorses the need to preserve local involvement and local understanding in all matters of land use. Having devised its zoning by-laws from careful examination of local resources and the testing of public opinion, a municipal council should not be easily dissuaded from its decision. On the other nand, a municipality is part of an area or region that, COSDI hoped, would be covered by a large area plan to guide the management of its resources and environmental needs. In particular, cumulative impacts and the varying capacity of resources are major considerations at this broader scale.

In recommendations for the *White Paper on The Sustainable Development Act, 1997,* the Manitoba Round Table believed a "two – approval" process would be agreeable to municipal representatives when they considered land use decisions. The Panel subscribes to this opinion as a result of its discussions and review, subject to working out the details by which the provincial approval is managed, and that reasons for a decision will always be made available in writing.

Recommendation:

- **New and expanding ILOs should require formal approval by both the host municipality for compliance with its land use by-laws, and the province for environmental impact before construction is allowed to begin.**

In summary, the site location options that a proposed intensive livestock operation would face would be:

- municipal approval and provincial approval – proceed with construction.
- municipal rejection – project stopped, or
- municipal approval and provincial rejection – project stopped.

As noted earlier, provincial approval could not be obtained unless the municipality had land use zoning by-laws in place.

Appeals of Location Decisions

Some presenters wanted the assurance that location decisions could be appealed to an independent authority, at arm's length from government. The Panel concluded that local autonomy would best be preserved if the land use decision of a municipality, when it has appropriate by-laws, could not be altered. The provincial decision, however, could be appealed on grounds that environmental factors require further consideration.

Generally, any process in an Act or Regulation, and perhaps in a Guideline, can be challenged in common law as to the adherence of the responsible authority to the procedural requirements of the relevant document. In the two options where the province is making a decision, the Panel believes that any stakeholder with a direct interest in the proposed project should have the right to appeal the provincial decision, but in none of the three options should the municipal decision be appeallable, except on procedural grounds.

Recommendation:

- **The provincial government should designate or appoint an appropriate Board or Panel empowered to investigate and rule on an appeal of a provincial decision to allow or disallow the establishment of any new or expanding ILO in Manitoba, and that the decision of that Board or Panel be final.**

In recommending an appeal procedure, the Panel believes strongly that the initial siting decision by municipal councils and the province should be as sound as possible. Furthermore, every effort should be made to keep the appeal process from becoming a long drawn-out legal process.

Public Participation

The COSDI recommendations on public participation set out, in some detail, a range of desirable interactions between a proponent of a development and the public, between the public and the governing body with permitting or licensing authority, and between the public and the agency charged with assembling relevant information. These recommendations are pertinent to the planning needs as outlined and to any significant allocation of a resource such as water supply. They can be used to guide the sharing of knowledge and investigations undertaken by a TRC advising a municipal council. The requirement is to involve interested people as early as possible in the planning process, making intentions well known and well understood, soliciting comment and criticisms, and generating a general atmosphere of consultation in which little is discarded without apparent reason.

Municipal councils customarily arrange a hearing to help the public understand a development. Land use implications, the proponent's intentions, designs, manure plan etc., and the report of the TRC are aired. This is a difficult process to manage, one inevitably beset by accusations of inclination to bias. It might best be conducted by an individual or agency disinterested in the outcome.

The Panel has two **suggestions** to improve the climate of interaction with the interested public and to enhance consistency across the province on matters of site selection.

- Based on COSDI, a guide could be prepared for use by proponents, government, and the public-at-large. It would outline a procedure to ensure that all interests are considered in the discussion of each proposal. Holding a consultation to prepare such a guide would be a useful participatory exercise in itself.
- There are a number of individuals and organizations in Manitoba that have the mandate and experience to facilitate public consultation. On the request of a municipal council, such an individual or organization could conduct a hearing and ensure all views are placed on the table through dialogue and questioning. The councilors would have the chance to contribute to the discussion and absorb its content. The provincial reviewers could be reminded of unexplored technical issues of investigation before a provincial decision is added to that of the council. Dissatisfaction with the selection process should be reduced. The municipal council decision would remain a separate process.

Assessing Environmental Effects

COSDI recommends a broadening of the concept of environmental impact assessment to include all the sustainability factors of a development. Intensive livestock operations are exempt from any full process under *The Environment Act*. Rather,

there is reliance upon the Livestock Manure and Mortalities Regulation to minimize the highest risk of environmental damage. Some presenters felt that all such intensive operations should be fully examined for their environmental, economic, social, cultural and human health impacts, and formally licensed.

Our view is that the Manitoba hog industry at the ILO level is evolving in a responsible fashion with respect to environmental awareness. There is an attitude among large operators, researchers and the industry in general that clearly includes an awareness of environmental risk. Safeguards can be sufficient if planning is careful, the technical review embraces all environmental factors, and existing regulations are applied and effectively monitored.

There are two possible scenarios that might require further assessment. The density of operations and their cumulative effect lurk, in our minds, as matters requiring study within an effects assessment process. We also believe that there are special ecological reserves, and provincial and national parks where the risk of disturbance and pollution, threats to biodiversity, and the possible diminishment of aesthetic and other cultural values should be illuminated and examined under a full COSDI style effects assessment when large scale livestock development is contemplated. Some suggestions follow.

Farm Practices Guidelines Review

Currently, the land base required to apply manure for a proposed hog operation is calculated on crop nitrogen requirements. As noted later in this report, phosphorus in excess of crop requirement is a consequence for most Manitoba soils, although a manure handling system consisting of an air-impermeable cover on the storage and field application by injection conserves nitrogen and as a result greatly reduces excessive phosphorus application. The Guidelines appeal strongly to the fact that these soils bind extra phosphorus, but to ensure their long-term sustainability, planning should anticipate a change in application rates, as has occurred in Quebec, which substantially increases the acreage needed for nutrient spreading. This can make a difference both to the task of assembling sufficient land - the operator's ownership, acquisition or contractual arrangements - and the number of operations the municipality will permit in a particular zone.

We also note that setbacks are calculated from the manure storage lagoon as center, yet a major source of odor (and subsequent complaints) is from fields during manure application. Reducing the density of future hog barns upon the landscape by regulating on phosphorus may be accompanied by more odor complaints.

Too little is said in the Guidelines to anticipate large area plans, nor do they discuss the ecosystems of the province and the need for protection of special places. The Guidelines can be a kind of forewarning to a proponent that some apparent locational opportunities should not be taken, or at least warrant enquiry and preliminary investigation to avoid future difficulties in an approval process.

These are but several examples that lead the Panel to **suggest** that the Farm Practices Guidelines need frequent updating and revision. It was clear to the Panel that this was a heavily used reference document that can, and should, reflect the practical implications of new research findings.

Technical Review Committees

The purpose of a technical review, as stated in the *Farm Practices Guidelines for Hog Producers in Manitoba,* is to provide support to local governments, when asked, to review an application for an ILO and to assist with the exchange of information between the proponent, the municipal council(s) and rural residents. It should be noted that TRCs are mandated as advisory to municipal councils and to this point have no authority or decision-making powers.

Clearly, such advice is of great assistance to any municipality investigating an ILO proposal. The TRC assesses the "fit" of the proposal in local zoning and for consistency with Provincial Land

Use Policies. It compares the proponent's intentions for setback, land for spreading manure, water supply etc., against both the recommendations in the Guidelines and information on soils, geology and well logs.

It is our perception that members of TRCs have performed their tasks with dedication and professionalism. However, in order to encompass wider responsibilities inherent in the COSDI principles, the Panel **suggests** the mandate and terms of reference of TRCs should be reviewed and revised, perhaps even strengthened. The task of the TRC should be to make wise decisions for the province on matters of location, and committee members should lead regional monitoring and enforcement. It may be assumed that the regional organization of TRCs will remain at the core of the review, monitoring and enforcement effort related to intensive livestock operations. The Panel believes the membership of TRCs should be broadened to include representatives from the Departments of Health and Labor, as well as other departments depending on the revised mandate. The chair of a TRC should be chosen to reflect the responsibilities envisioned under the revised mandate.

The point was made often at the hearings that Manitoba has a very low livestock population per acre as compared with other provinces and the United States. Yet there are pockets of considerable concentration of hogs in some areas of Manitoba. It is ironic that advantage is not always taken of Manitoba's geography to disperse operations. On the face of the matter, expansion can be accommodated easily, neither threatening our natural resources nor disturbing the neighbors. Without speculating on this situation, our view is that a broader and longer term perspective can be stimulated by TRCs to approach the requirements of The Sustainable Development Act of 1998, and to test the potential impacts of a proposal against these principles.

All departments and agencies of government were committed to using the "Principles and Guidelines of Sustainable Development," as set out in schedules to the Act, in their policies and operations. In moving implementation forward along COSDI lines, reviewers might look at the regional implications of their recommendations, broaden their notions of cumulative impact, draw in expert opinions on the possible effects of the project on human well-being and human health, look more tightly at the requirements for preserving biodiversity, and, in general, step beyond a check-off approach to their advice to the municipality. Above all, the Act's version of the "precautionary principle" should be kept in mind:

> *Manitobans should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and actions, having particular careful regard to decisions whose impacts are not entirely certain but which, on reasonable and well-informed grounds, appear to pose threats to the economy, the environment, human health and social well-being.*

The Panel **suggests** (tentatively because the operation and membership of TRCs have not been examined closely by the Panel) that TRCs require more orientation and training to their task, particularly in broad environmental issues such as COSDI recommends. Their task is extremely important for the sustainability of the province's resources, more so as expansion of Manitoba's livestock sector continues.

Geographic Information Systems (GIS) as a Planning Tool

Planning at any scale can be greatly facilitated by the digital recording and spatial depiction of attributes which characterize the landscapes of the province, from those within a region or a drainage basin to those of a municipality or even the surroundings of a specific ILO. GIS enables data on soils, water, land use, geology and other natural resources and features to be combined with data on roads, utilities, towns, villages, residences, agricultural operations and so on. By linking such data with regulations and by-laws in a graphical format, decision-makers can assess alternatives and better understand the impacts of development proposals.

There are a number of municipalities where GIS has been used very effectively through the cooperation of PFRA and provincial agencies. The Panel's impression is that municipalities are eager to use the GIS tool for screening purposes, albeit ground proofing is necessary. There seem to be two impediments. One is that a considerable amount of "digging" for information input is necessary – from the municipal files for the location, type and scale of development and from provincial government sources for most resource information. This might best be handled by a central service which can collect, interpret and update information and act as a consultant to RMs, TRCs and producers.

The second impediment is one of financing. Who pays for the service to the RMs for planning purposes? Should a proponent of a development share in the cost of the investigation of a specific site? These are policy questions beyond the scope of the Panel's terms of reference. They touch upon the broader issue of the availability to the public of information often already collected at public expense. Further costs to cash-strapped municipalities will inhibit GIS use.

The Panel **urges** a swift examination of the means by which municipal use of GIS can be expanded for better planning and the reduction of risks. This is not only a site-specific issue. There is a need throughout the province for information from GIS in the process of planning or development and seeking to apply sustainable development principles to a regional situation. We also urge policy makers to find an approach that improves the availability of such information to any bona fide user.

Recommendation:

- **The province should recognize the value of GIS and act promptly to find the means to facilitate its use as a planning tool in municipal government as well as in provincial government departments and agencies that need alternative approaches to the exercise of their mandates.**

Location, Location, Location

In summary, from the points-of-view of minimizing local discord, protecting the local environment, maintaining our health and sustaining the resources and landscape of Manitoba, carefully selecting the location of an ILO is of primary importance.

CHAPTER 6

ENVIRONMENTAL AND HEALTH CONCERNS

Many concerns were raised about environmental and health issues during the Panel's public consultations, as well as in subsequent discussions. For purposes of analysis, these have been grouped under four main categories: water quality, air quality, health issues, and climate change and livestock.

Water Quality

Fears were often mentioned in presentations at the public hearings of deteriorating surface water and groundwater quality due to established and potential ILOs. Concern focused chiefly on large hog operations, and included both potentially leaking manure storages, be they constructed of steel, concrete, or earth, and on contamination of both surface water and groundwater due to manure application to land. Fears of water contamination in areas with a preponderance of porous, sandy soil were often mentioned. The regulation of manure spreading according to nitrogen content rather than phosphorus content, which can lead to an over-application of phosphorus and the potential for eutrophication, was also frequently mentioned, as was contamination of fields with the parasites and pathogens contained in the manure.

Also mentioned, but less frequently, were the possibilities of water contamination due to cattle feedlots, and of water contamination and riparian habitat destruction due to extensive cattle grazing. Several presenters pointed out that there was also the potential for water quality effects of other agricultural practices, particularly commercial fertilizer application, and stressed that livestock effects must be evaluated in the context of all activities in a watershed, including domestic sewage effects.

As mentioned earlier, a research round table on water quality was convened to assess the state of scientific knowledge on the relationship between livestock operations and water quality, current water quality monitoring programs, and the status and trends in the health of Manitoba's ground water and surface waters according to these programs. Based on what was learned during this exercise, as well as from other information sources the Panel makes the following observations and conclusions.

Generally speaking, the negative effect of specific large livestock operations on water quality has not been scientifically demonstrated. However, cumulative effects, likely from various sources including other agricultural activities, are producing deteriorating water quality in, for example, the Assiniboine River and Lake Winnipeg. The situation regarding recent eutrophication of Lake Winnipeg is particularly urgent. Research also indicates a reduction of biodiversity at several sites in Manitoba due to livestock operations (Pip 2000).

Unfortunately, inadequate monitoring of current livestock operations, and cutbacks in the 1980's and 1990's to both federal and provincial government water quality monitoring programs have left us in the situation of not being able to adequately assess the water quality effects of large livestock operations. The current level of monitoring and the system for coordinating and reporting monitoring results are insufficient to give the public confidence that the current intensification of agriculture is environmentally benign.

Procedures and guidelines for the location of large livestock operations, particularly with respect to manure storage and application, are much improved over the pre-1998 situation. Effects on water quality of pre-1998 manure storages that are not regularly inspected and maintained are of public concern, as are operations with less than 400 AUs. These smaller units are not prevented from spreading manure in winter which results in the greater likelihood of nutrient escape into water sources during spring run-off.

Concern About Phosphorus

In pre-agricultural times, the quality of Manitoba's waters was undoubtedly better than it is today. In those times, phosphorus, which is bound to soil particles, was discharged into streams, rivers and lakes in run-off at relatively low concentrations compared with today. As soils were developed for agriculture by clearing forest and breaking prairie, soil erosion increased, and with it, the amount of phosphorus delivered from soil to water also increased. Initial crop yields on these newly developed soils were high, but quickly declined as crop nutrients, chiefly nitrogen and phosphorus, were used up. Nitrogen and phosphorus, in the form of commercial or inorganic fertilizer, began to be added in ever-increasing amounts to the soil to restore crop yields.

Phosphorus is acknowledged to be the critical nutrient influencing the primary productivity and development of algal blooms in freshwater ecosystems. The addition of large quantities of additional phosphorus from external sources to Manitoba's soils likely increased phosphorus levels in our waters. However, most of this externally added phosphorus was shipped out of province in the form of grain.

The development of intensive livestock production in Manitoba has changed the dynamics of phosphorus movement. Grain containing the phosphorus that was previously exported to Europe or Asia is now being fed to livestock here at home. As manure from this livestock is applied to cropland, the phosphorus that previously would have been lost to the production system through export is now being recycled. One possible effect of this recycling is an increased phosphorus escape from soil to water and an accompanying increase in algal blooms, causing a decline in water quality. One manifestation of this effect may be the current situation in Lake Winnipeg, where large algal blooms have begun appearing in the north basin whereas in the past they appeared only in the south basin. However, the relative importance of manure, inorganic phosphorus and municipal sewage to water quality in Lake Winnipeg is not well understood.

Direct Run-off

Two particular characteristics of western Canadian settlement are known to have serious, detrimental effects on water quality.

People settled and developed farmsteads along watercourses, in order, among other considerations, to provide a source of water for their livestock. As a consequence, large numbers of cattle feedlots and wintering areas contribute run-off water to streams, and undoubtedly are having impacts on the Assiniboine River and Lake Winnipeg. Several government and non-government agencies are offering programs to encourage setbacks of livestock operations from water bodies. The federal Department of Fisheries and Oceans is in the process of taking steps to protect fish habitat. In addition, some producers are individually taking appropriate remedial measures.

Secondly, there have been a very large number of wells constructed throughout rural Manitoba since the mid-1800s to provide domestic and stock water. Many of these wells are deteriorating through disintegration of the casing, and provide a direct link between the ground's surface, where animals live, and the aquifers below that continue to provide domestic water. Aquifer contamination through such wells is thought to be responsible for a number of deaths near Walkerton, Ontario last summer. But perhaps even more serious is the large number of abandoned rural wells, many whose locations are no longer known. The potential for aquifer contamination from such a source is large. Several Conservation Districts offer programs to fill and seal abandoned wells, but doing the job properly requires resources in excess of those currently available.

Studies to assess the environmental impact of a range of human and agricultural activities, including domestic sewage, irrigation, and grain, vegetable, and livestock production, are currently not being carried out on an adequate spatial or time basis. Such studies, which must include measurements of the presence of nutrients (nitrogen and phosphorus), pathogens, parasites, and soil particles in surface and ground waters, are

essential to an evaluation of the impact of intensive livestock production on water quality. The impact of agriculture in general, and ILOs in particular, on water quality must be evaluated within the context of other human impacts on the landscape.

Recommendations Regarding Water Quality

Based on these observations and conclusions, the Panel makes a number of **recommendations** relating to water quality:

- **Water quality monitoring must be greatly increased to provide an assessment of the impact of livestock production on soil and water. A critical constraint to achieving this is the inadequate level of staffing for monitoring.** A monitoring system with sufficient detail to provide a water quality impact record of individual barns and groups of barns is required to give Manitobans a measure of the impact of ILOs on water. In addition, long-term monitoring of nutrient presence in ground water and surface waters from the range of agricultural operations, measured against a baseline of natural levels, is essential. The Deerwood Project, near Miami in south-central Manitoba, is a start in this direction, but more effort is needed.

- **Additional enforcement effort is required to ensure compliance with current regulations, particularly concerning manure management and storage, and penalties for infractions need to be increased.**

- **The province should move toward regulating manure application according to phosphorus content of soil and manure, and future ILOs should be located in order to provide sufficient acres for manure application according to phosphorus content.**

- **The province should continue to implement the recommendations of the recently released Drinking Water Advisory Committee Report, especially recommendations for a drinking water coordinating center that is properly staffed and supported.**

Air Quality

Probably the most emotional reaction to hogs is related to issues of air quality, often in the context that "pigs stink". The concerns raised at the public meetings ranged from odors impacting the quality of life of neighbors, to health hazards for barn workers, to disease transmission from animals to humans. The challenge facing the Panel was to separate largely emotional reactions to the nuisance of odors from genuine health hazards. We attempted to "get a handle" on the science, but found it an extremely complex area with woefully inadequate research. What follows is a brief commentary on the issue of odors from livestock operations. Health issues are covered in a following section.

Odors are among the hardest contaminants to manage because of the inherent subjectivity associated with measuring and defining what constitutes unacceptable levels. The reaction to odor in hog barns visited by the Panel ranged widely. People who are worried about odor from livestock operations probably will never accept assurances from government or industry that odors are not a problem unless it is possible to actually measure intensity at a site rapidly, with results that can be reproduced. Public tolerance is modified by the duration of an event and how often it is repeated. Different kinds of odor from swine, poultry or cattle, for example, produce different psychological and physiological reactions. All these factors challenge research and the development of practical measurement devices while the industry addresses the task of reducing the strength of odors and arranges its infrastructure so that the worst can be avoided. It is also important to note that the reduction of odors often runs in parallel with the protection of health. A clean and well-ventilated barn means fewer pathogens for potential transfer to workers as well as a less offensive aroma.

Some presenters at the hearings, deeply concerned about odor which affects their enjoyment of rural life, found it anomalous that a municipal council would first zone and subdivide to attract their residency then allow an ILO to locate near enough to cause a nuisance.

Others advocated special areas within agricultural zones for these operations, where they were least likely to create disappointed neighbors. It was often said that Manitoba municipalities have plenty of space in which to maneuver. The Panel itself continues to wonder why the setbacks suggested in the Farm Practices Guidelines are seldom exceeded.

Notwithstanding our sympathy for the "right-to-farm" advocates and bearing in mind that new ILOs will be more effective in odor control than those of the past, we believe that initial siting decisions should receive very careful analysis of potential air quality issues that can be assembled by the municipality before each decision is rendered. This should take into account how the operator intends to cover the storage and how and when the manure will be spread. Local climate and landscape might be as important in odor distribution as distance to neighbors in some parts of the province. Considerations of cumulative impacts should include the effects of on-site expansion in the future as well as the general regional air quality to which clusters of ILOs contribute.

Odors originate from barns, manure storage and manure spreading. Minimizing their impacts is very much a management consideration, management that includes a commitment to maintaining the best possible relationships with neighbors. Operations should be sufficiently flexible to allow for spreading, for example, to accommodate both the neighbors' life-style and the weather.

Looking to the immediate future, covering manure storage either with straw or fabric, using feed additives to reduce odor production in the animal, and swift incorporation of manure into the soil promise better air quality at least expense for improvement in practices. There remains the fact that aerobic treatments such as aeration and composting, though more effective in odor control as compared with slurry systems, are less convenient and more costly.

Similarly, effective measures to reduce nitrogen loss by covering manure storage or direct injection of manure into the soil are also accompanied by odor reduction. Current research into the quality of the nutrient and its mode of distribution is also likely to lead to some odor reduction.

The idea that manure is a waste rather than a resource continues to linger in our psyche. We speculate that this attitude is not yet wholly purged from the industry, let alone from the general public. Scientific testing of stored manure to match its nutrient availability with that of the soil and the needs of the crop, rather than estimating each of these factors, is clearly warranted. A potential double benefit exists here. Perhaps this is indicative of the need for stricter standards for the removal of manure from storage and spreading it on to or into the fields.

Our view is that the utmost care in managing the sources of odor will always be required. While improvements in reduction of odors based on a steady research effort can be expected, we are less optimistic that odor complaints will decrease.

Suggestions and recommendations pertinent to air quality follow "Health Issues" below.

Threshold Level for Regulation of ILOs

Concerns regarding water and air quality impacts of ILOs have raised the question of the appropriate level for regulating the size of ILOs. Current regulation requires an annual manure management plan to be filed with Manitoba Conservation for an operation with 400 AUs or more. Though the practice is discouraged, operators with less than 400 AUs are permitted to spread manure in winter. A lower threshold level was advocated by many presenters at the hearings. The Panel was also told that it should be cumulative across species, that is, the regulations should kick in when the animal units in hogs plus those in other livestock exceed 400. The cut-off in other provinces is generally 300 AUs. Under The Clean Water Act in the U. S., a "point source" includes a concentrated animal feeding operation and regulatory control begins at 300 AUs. In Europe, the mode is to control on the basis of the number of animal units per hectare of land used by an operation.

The main argument from moving from 400 AUs to a lower threshold in Manitoba, however, is that this is a step in controlling nutrient escape. The Panel believes that lowering this number should facilitate planning and increase the general knowledge of the livestock industry in terms of both location and stewardship. The Panel did not have the opportunity to explore the question in depth, but it believes the question warrants careful study in the Manitoba situation, taking into account the density of operations upon the landscape.

Recommendation:

- **The calculation of animal units should be cumulative across species.**
- **In view of the lower threshold level in other provinces and some municipalities in Manitoba, the Livestock Manure and Mortalities Regulation should be modified to require manure management plans for all new and existing ILOs of 300 AUs or more, and that winter spreading of manure be prohibited for all new and existing ILOs above 300 AUs.**
- **This reduction should be phased in over a reasonable period and should be coupled with an expanded monitoring effort, expert advice and, possibly, incentives to encourage revamped manure management structures.**

Health Issues

The public perception of health issues associated with the intensive livestock industry is influenced by four circumstances.

First, there is a lack of confidence that government is "on the ball". Expansion of livestock numbers, especially hogs, is not perceived to be accompanied by adequate monitoring and enforcement that anticipates problems and responds quickly to them. Although there is enough evidence to suggest that bacterial contamination of water supplies, for example, has been around for a long time, the logic is that when manure is produced in large volumes, the risks are increased. Efforts by the industry to point to the care with which pigs are raised - the market is a potent force to encourage disease-free production - are likely to be met with skepticism.

The second and very current circumstance is directly connected with the Walkerton findings and the Manitoba Drinking Water Advisory Committee Report. Notwithstanding the valuable lessons and good intentions that follow such investigations, e.g., regular testing of water, the public asks why government has to catch up with the data and what is to be done about prevention of water pollution.

The third circumstance is that odor and personal health are intimately connected in peoples' minds. The view is that if it stinks, it can't be healthy - even allowing for a higher tolerance on the part of farmers for odor! Some presenters at the hearings felt that if odor were better controlled, the complaints about the expansion in hogs would diminish.

The last circumstance is that the media makes the most of every potential threat to public health, putting insufficient energy into collecting the range of scientific opinion that directly relates to issues about the Manitoba environment.

If the risks to health are contained, and are seen to be contained, by the actions of an alert government, will there be less opposition to intensive livestock operations in Manitoba? The question cannot be answered in this report. We do know, however, that the industry has to establish its reputation for meticulously attending to health issues.

The discussion that follows is intended to highlight some conclusions that seem important from a wide documentation and discussion of health impacts related to livestock operations. It is not an overview in the sense of some documents we have received (Mussell and Martin 2000, Pip 2000), but it has given the Panel the basis for a number of recommendations.

Waterborne Transmission of Pathogens

The following quotation seems to capture the waterborne transmission process from livestock to humans in a way that stimulates thinking on practical, defensive measures that operators can take.

> *Four primary steps need to occur for waterborne transmission of pathogens from livestock to humans. Eliminate any of these steps and transmission of the specific pathogen from livestock to humans through water can significantly be reduced or even stopped completely. First, the pathogen must be excreted by livestock. Second, the pathogen must reach a water supply either by the animal defecating in the water, by overland flow (runoff from a grazed pasture during rainfall, snowmelt etc.), by subsurface flow, or by combination of these three pathways. Third, the pathogen must retain the cellular functions necessary for initiating a new infection in humans during the time it is in the environment. Lastly, given that the pathogen is shed by livestock, reaches a water source, and remains infective until ingested by a human, the concentration of infective pathogens must be sufficiently high in order to initiate an infection. (Atwill 1997)*

Such interventions engage the attention of a good operator every day. In a hog barn, for example, he can start with pathogen-free stock, raise pigs in age groups, sanitize between batches, and be strict about bio-security. He is regulated on manure handling and livestock mortalities under provincial law, and subject to inspection of what is regulated. He can organize the specializations of his workforce around the intervention points. There is a continuous flow of updated information from trade and research organizations. The market imposes strong discipline, especially on product quality. As for all types of farming, there is an opportunity for the public to prompt investigation of inappropriate behavior under *The Farm Practices Protection Act.* At the hearings, we heard opinions that the in-barn operations of ILOs are usually well conducted. Despite these assurances, however, we wonder whether sufficient inspection is maintained to confirm this view. The public makes judgments based on its sense of smell and contact with barn workers. It knows very little of the procedures in the barn. Lack of knowledge intensifies fear.

It is the situation outside the barn to which most regulatory attention has been addressed, seemingly for two strong reasons - the usefulness of the nutrients in the manure, and their potential for overloading ground water and surface waters if not handled carefully.

Traditionally it was thought that a lot of pathogens would die once they left an operation and the manure was incorporated into the soil. Naturally occurring soil bacteria do attack manure pathogens with vigor, but some survive in the manure and eventually reach humans. One intervention is to hold manure in storage until the pathogens die. Unfortunately for the operator, that time varies substantially. For example, E.coli 0157-H7 is said to survive more than 100 days in bovine manure at -20C, Salmonella 35 days in a manure pit at 22C to 27C. Animal faeces containing Giardia cysts and Cryptosporidium oocysts should be distributed on fields during warmer weather and after 12 weeks of storage to reduce potential water contamination following heavy run-offs, (Olson, 1999). There is undoubtedly a "best practice" for intensive livestock operations in Manitoba. Finding it should be a research priority.

Towards Healthier Breathing

In-Barn Air Quality

Ambient levels of gases and dusts inside confinement hog facilities can be a health hazard to workers as they can potentially contain harmful levels of ammonia, hydrogen sulphide, methane, endotoxins, carbon monoxide and carbon dioxide. In addition, the air may include dust particles made up of feed components, dried faecal material, hog dander, moles, pollen, grains, insect parts and mineral ash. With the increased use of confinement operations and the need for full-time staff, air quality has become an important issue related to worker health. A substantial reduction of the dusty and odorous work environment

would ensure improved worker health and assist the industry in attracting capable and qualified staff.

Because of the combinations of various gases and dusts present in the barn, the air may have a more negative impact on health than any one type of agent or gas. The severity of an individual's symptoms depends on the duration and time spent in the barn, the concentration of contaminants, the usage of personal protection equipment and the individual's susceptibility. Sensitivity also varies from person to person, depending on their general state of health. However, the most common health problems are dust-related: coughing, phlegm build-up and scratchy throat.

Chest tightness, coughing, nasal and eye symptoms can occur within 30 minutes of entering a barn but usually require two or more hours of exposure. This bronchitis results in excessive coughing and phlegm production and is usually worse in winter when ventilation rates are lower to conserve heat. Workers may experience delayed reactions up to six hours after working in confinement barns. Organic dust toxic syndrome (ODTS) often occurs after moving or sorting pigs, or cleaning the building or grain bins. Its symptoms can include fever, malaise, muscle aches and pains, headache, cough and tightness of chest. Full recovery may take three or more days. It is often mistaken for the flu.

Long-term exposure can result in chronic bronchitis, decreased respiratory capacity, occupational asthma related to allergens and dust, and increased sensitization to allergies. A recent study has shown that odors also can cause negative moods that can depress the body's immune response and influence physical health.

Of equal concern is the exposure to potential diseases and the use of animal antibiotics on human health. Manure can contain microorganisms that pose health risks to workers from infection and microbial toxins. Many infectious organisms that cause disease in animals can also cause illness in people. The potential exists for some of these microorganisms to be transmitted through the air. Use of anti-microbials to prevent the rapid spread of disease in confined barns may result in the evolution of resistant organisms. Clearly, research is needed to better understand the extent and severity of these potential health risks.

Management controls, personal respiratory protection and engineering interventions have an important role in reducing health risks due to in-barn air quality. Management controls, especially in barns with poor air quality, could include limiting the time a worker spends each day in the building. This would allow "recovery" time from the exposure. Personal respiratory protection would include the use of dust masks, full-face respirators or gas masks. Studies have shown that the reduction in the amount of dust inhaled is very substantial for a properly fitted mask. Chemical cartridge respirators also are effective for removing certain gases. For oxygen deficient areas such as manure pits, supplied air respirators are necessary. Although the issues of discomfort and difficulty communicating have hindered the use of masks, education efforts are encouraging younger workers to use respiratory protection.

Engineering controls include the use of agents to reduce dust and gases, installation of monitoring equipment to record toxic gas levels on a continuous basis and installation of adequate ventilation systems. Recent research has indicated that by adding two percent canola oil to the feed, the respirable dust concentrations are reduced 45 percent. Further, spraying a mixture of five percent oil and 95 percent water in swine buildings also can reduce dust mass by 60 to 90 percent. This spray mixture also reduces ammonia levels. Minimizing the distance feed drops from feeding systems and the diameter of the pipe it is dropped from help reduce dust levels. Air filtration and scrubbing and air ionization are also effective in dust control. However, nothing can surpass simple good management — keep the barn clean!

Farmers who employ workers have to follow the same occupational health and safety rules that apply to other industries. To date, monitoring of hog barn air quality by government departments has been minimal. Instead, the focus has been on

ensuring that the building design will reflect the latest technologies available to maximize air quality. It has been assumed that the operator will follow practices to ensure maintenance of good air quality.

Despite the philosophy of best intentions, agriculture workers are not covered by labor legislation in Manitoba. Many believe that minimum wage provisions and Workers Compensation should protect all workers in the livestock industry. Others feel that education and staff training programs are the best means to ensure compliance and ongoing due diligence.

Both the employer and the worker share the responsibility for a safe work environment. Employers must provide sufficient training and information, while workers must follow established safety and health policies and utilize equipment in a responsible manner. Because of this, there is an ongoing need to undertake research on exposure limits, the impact of exposure to multiple airborne hazards, the long-term effect of air quality and the impact of viral interactions on worker health, and to communicate this information in an effective manner to the farming and health communities.

Air Quality for Residents Near ILOs

Some view odor as a nuisance rather than a health issue. Others mistakenly assume that taking care of odor is synonymous with addressing the health problems of people who live near ILOs. For hog facilities specifically, the Panel heard some complaints that nearby residents experience symptoms of fainting, weakness, dizziness, nausea and respiratory problems that mimic those experienced by inside workers. The lesson from this for the Manitoba industry is, again, that very careful attention must be paid to the initial siting of an ILO, taking advantage of the space and terrain, and being cautious about clustering. A current study by DGH Engineering and Laval University which involves interviewing neighbors of a large number of hog barns regarding experience with odor, will provide important information on how much hog barns stink, on health concerns, and on the adequacy of municipal by-laws regarding separation distances to nearest neighbors.

Antibiotics

The Panel heard little about the use of antibiotics as a production tool in raising livestock. As long ago as 1972, the U.S. Food and Drug Administration proposed that all antibiotics used in human medicine be used in animals only for short-term therapeutic purposes prescribed by a veterinarian. A recent letter from 30 organizations and over 50 doctors to the Commission of USFDA (Lai 2000) urged the banning of subtherapeutic uses in livestock of any antibiotics used in (or related to those used in) human medicine. On November 10, 1999, a bill called The Preservation of Essential Antibiotics for Human Diseases Act of 1999 (Brown, Waxman, Slaughter) was introduced into the U.S. House of Representatives. It stated that seven antibiotics, including penicillin and tetracycline, already approved as livestock feed additives, must be banned if, within two years, the drug-maker does not submit data that such use is safe. As well, it should be noted that Canada and the U.S. are well behind Europe in introducing these protective measures.

In essence, the concern has become widespread that bacteria develop defense mechanisms against antibiotics and become resistant to drug effects. When such resistance develops, the bacteria are no longer killed, and the antibiotic is incapable of treating or curing the disease. Humans are sickened through exposure to infected animals and from tainted meat bearing the resistant bacteria. They are not readily cured from treatments commonly prescribed.

The Panel was confronted by one opinion that intensive livestock operations are not feasible without subtherapeutic drugs in the food supply, and another opinion that, in Manitoba, we are not using antibiotics to a significant extent. The Panel's view is that practices in Manitoba, such as adding antibiotics to feed, require careful examination by industry, the medical profession and Manitoba Health. The Panel has the impression that, if there is a stance or policy on this matter, it is not in the public domain.

Disposal of Livestock Mortalities

The disposal of livestock mortalities is not addressed in this report, as there were few references to it at the public meetings. However, the Panel suggests that government review current practices, regulations, monitoring, and inspection to assess the capacity of this part of the industry to handle livestock expansion, and reassure Manitobans that health risks from this source are minimized.

Recommendations on Health Issues

The Panel believes that attention to improving water quality, as recommended earlier, and the improvement of management practices, can go far to further reducing the risks to health from ILOs.

Recommendations:

- **Strong research and development emphasis should be placed on the monitoring of pathogens and the mechanisms by which they are transferred from animals to humans, and upon factors such as the design of barns, manure storages, and spreading practices which minimize such transfer.**
- **Government, in conjunction with the industry, should review the in-barn environment with a view to:**
  - **establishing a monitoring regime and ensuring compliance with existing regulations, especially those affecting the health and safety of workers,**
  - **assessing the training needs of barn workers, and**
  - **identifying research priorities which bear upon the health of operators, workers and the nearby public.**
- **All barn workers should be strongly encouraged to wear proper masks.**
- **Greater attention should be paid by the industry and government to familiarizing the public with the in-barn environment and precautions that are taken to raise healthy animals.**
- **As a matter of responsibility to Manitobans, government and the industry should make clear why and how the industry uses antibiotics.**

Livestock and Climate Change

Climate change, caused largely by human activities, is acknowledged by the world's climate scientists to be occurring, and recent predictions of timing and intensity of severe weather events make the situation worse than previously believed. Agriculture, including livestock production, is a source of the greenhouse gas emissions that cause climate change (about 10 percent in Canada). Sources of concern regarding livestock include emissions of methane. Methane is emitted from manure storages and from both ends of ruminants. Emissions can be reduced significantly, for example, by covering manure storages and by injecting liquid manure below the soil surface. Covered storages and manure injection also reduce odors significantly and reduce nitrogen losses, thus preserving the nutrient content of the slurry.

Major predicted effects of climate change on agriculture include an increase in annual mean temperature, with the greatest increase coming in winter, an increase in the variability of weather, including heavy rainfall and floods, and a change in the precipitation regime. Precipitation predictions are less reliable than those for temperature, and currently indicate drier winters and summers, and wetter springs and autumns, although there is the possibility of increased drought, especially in southern areas.

Consequences of climate change to livestock production will largely relate to water shortages, even drought. Therefore, production systems with a minimum water requirement should be researched and developed. Increasing variability of weather means that floods will continue to occur, with perhaps increased frequency and intensity. The siting of livestock operations on flood plains or areas prone to flooding should require

additional precautions in manure storage design to guard against manure having an impact on the environment as a result of flooding.

Recommendation:

- **The Government of Manitoba should give serious consideration to accelerating the process of making the public generally, and the agriculture sector particularly, aware of the impacts of climate change, and the range of measures for mitigating and adapting to climate change.**

CHAPTER 7

MANAGEMENT ISSUES

During its travels and discussions, the Panel heard many comments about sustainable livestock management. We simply did not have the time or resources to adequately assess all of them. However, we do wish to comment on five specific issues: manure management, sow housing, riparian management, performance bonds, and demonstration sites.

Manure Management

At the public hearings, those in favor of large hog operations often expressed the view that manure is a valuable product, capable of replacing expensive inorganic fertilizer and improving the soil, and should not be treated as a waste. They felt that the post-1998 engineered and inspected earthen manure storage was a cost-effective and safe system, and pointed out that the handling and disposal of livestock manure was more ecologically sound than the current practice regarding human sewage.

Those opposed to large hog operations spoke of manure as a stinky environmental hazard, containing parasites, pathogens, and heavy metals, and expressed the view that earthen manure storages were leaking and polluting groundwater. They felt that manure was often being applied to land at excessive rates, and that application rates should be determined by phosphorus content, rather than nitrogen content, as is currently the case. They also felt that the present regulations regarding storage and spreading of manure were not being monitored or enforced. Less concern was heard relating to manure resulting from other ILOs or from extensive cattle grazing.

As mentioned earlier, the Panel convened a research round table to examine the science of manure storage and application, and to discuss problems, alternatives, and additions to the current system, as well as the relationships between livestock and greenhouse gas emissions. Manure was also a common topic of discussion during the Panel's travels.

These various discussions led the Panel to a number of observations and conclusions.

- Nutrient management (that is, balancing the use of manure and inorganic fertilizers for crop production) is a skill that must be mastered if a farm operation is to be sustainable.
- Newly-broken soils, resulting from the clearing of forest or the breaking of grassland, produce excellent yields for several years, until the N and P levels, which are reduced with each crop produced, decline to levels which limit crop growth. Higher crop yields can be restored by adding sufficient nutrients, chiefly N and P, to the soil to provide for the crop's requirements. Nitrogen is added in the form of anhydrous ammonia, urea, or ammonium nitrate, all of which are provided from fossil fuel sources. The phosphorus requirement is supplied from phosphorus-bearing rock, which is mined. The cost of this commercial or inorganic fertilizer is largely based on the cost of natural gas, and continues to increase, independent of the price of the crop that it produces. The amount of inorganic fertilizer used per acre is unregulated, as is its application relative to the location of groundwater and surface waters.
- The addition of an ILO to a large grain farm can increase its environmental and economic soundness by recycling nutrients, chiefly N and P, that otherwise would be exported in crops, and by providing a local market for feed grain. As well, the additional labor requirement of such operations should have a positive social impact.
- Manure must be managed as a valuable commodity, capable of reducing the requirement of both forage and grain crops for inorganic fertilizer. Management must be

directed toward maximizing the transfer of the nutrient contained in the manure to the crop to which it is applied, while at the same time eliminating any possibility of escape of these nutrients into surface and ground water, and reducing odors and greenhouse gas emissions. Techniques that help accomplish these goals in liquid hog manure systems include an air-impermeable cover for manure storage and spring injection of manure slurry into annual crops and forages. Production systems using dry manure can address these goals through well aerated composting and the immediate incorporation of spread compost.

- The current monitoring and enforcement procedures regarding manure storage and application are insufficient to give the public confidence that manure from ILOs is being handled according to the principles of sustainable development. A recent study (DGH Engineering 2000) indicated that the level of knowledge regarding manure management among hog barn operators needs improvement, as does compliance with manure management plans. Procedures concerning the reporting of inspections of manure storage sites and soil testing of fields to which manure has been or will be applied are inadequate. It has been suggested that only about 10 percent of the land is tested regularly, and that custom manure applicators do not routinely have the capability to apply manure on a soil test or nutrient basis. This is because commonly used equipment has no mechanism to effectively control flow rates. (PFRA 2000).

- Livestock operations of over 400 AUs must comply with manure management regulations that require testing the manure slurry and the fields to which it is to be applied for nitrogen and phosphorus. The manure must then be applied at agronomic rates according to field nutrient levels and the projected nitrogen uptake by the next crop. Regulation of manure application according to nitrogen means that phosphorus in excess of crop requirement may be applied. There is concern that this excess phosphorus could enter surface water and groundwater and lead to eutrophication of rivers and lakes. Manitoba soils have a large capacity to bind extra phosphorus to soil particles, and, for the present, as long as soil erosion is controlled, the excess phosphorus from manure application should not cause eutrophication. However, the capacity of our soils to bind extra phosphorus is not limitless, and the regulation of manure spread according to nitrogen content only is not considered to be sustainable.

- Long-term studies to determine the impact of the use of manure and inorganic fertilizers on the sustainability of our current system of agriculture (including field crops, livestock production, and irrigated agriculture) are essential, and are not currently being done. These would include measurements of the extent of nitrogen and phosphorus in surface water and groundwater, Without such studies, it is difficult to place the impact of livestock production within the context of the impacts of other types of agriculture, and the impacts of human society (e.g. leaking private septic fields and municipal lagoons, and urban run-off) on the Manitoba environment.

- The anaerobic digestion of manure to extract methane, the chief constituent of natural gas, is practiced in some countries, such as Denmark and Germany. Methane represents an energy source, and its conversion to carbon dioxide by burning has benefits concerning greenhouse gas emissions. Unfortunately, an efficient methane production process requires winter temperatures in excess of those found in Manitoba. Research into a lower temperature process is ongoing, and hopefully, methane extraction can be added to current methods of manure processing.

- The liquid manure system found in all new, large hog barns can be designed and operated to provide efficient transfer of nutrients from hogs to cropland, while at the same time reducing odors. But it is based on the continuous availability of large volumes of water. Prairie Canada regularly suffers from drought and growing demand for water.

Consideration must be given to adapting a liquid manure system to times when the available water supply may be insufficient.

- Land settlement patterns led to many cattle operations being located along water bodies, with the resulting potential for manure pack seepage into surface water, and subsequent nutrient enrichment of lakes and rivers. Further, many pasture operations permit cattle to have summer access to streams, rivers, and lakes. The efforts of organizations such as the Manitoba Habitat Heritage Corporation (MHHC) and Ducks Unlimited (DU), and enlightened cattle producers, to trap manure pack run-off in catchment basins, and restrict or eliminate the access of cattle to natural waters, are applauded and encouraged.

The understanding of manure management and the long term impact of manure as a nutrient, as well as the skilled application of nutrients, is of vital importance to sustainable livestock development in Manitoba.

Recommendations:

- **Educational institutions, in cooperation with industry and government, should re-assess the training requirements for professionals and technicians in the nutrient management field.**
- **The Provincial government should move towards the formal certification of commercial nutrient applicators.**
- **For reasons of odor control, reducing greenhouse gas emissions, and maximizing nutrient capture, ILOs should be encouraged to implement covered manure storage and injection.**

Sow Housing

Attention to the welfare of livestock, especially those raised in confined quarters, is growing for several reasons. As society becomes more urban, it becomes less familiar with modern farming practices and how food gets to the table. These modern practices have likely resulted in the decline of animal welfare relative to earlier "free range" conditions. Animal welfare organizations have responded by addressing the well-being of the animal while it is alive. One of the more controversial practices in hog production has been the confinement of pregnant sows in gestation stalls. The media have helped to make this a "hot button" urban issue.

Considerable research has been concentrated on maintaining productivity at least cost by the improvement of genetics, nutrition and pathology. Considerably less research has been focused on animal behavior and housing. It has yet to be shown conclusively that reproductive performance and weight gains are better in alternative housing arrangements. One popular and economical answer to the confinement housing traditionally seen in hog operations is the group housing systems referred to as biotech or hoop barns. A more detailed description of these systems is provided in the Panel's separate technical document.

The Panel is not equipped to make definitive recommendations on these points except to emphasize the very real need to accelerate research to discover how to house livestock for maximum well-being, especially in confined birthing and rearing systems. We take the view that the industry cannot afford to relax, and must continually consider alternatives and test new approaches. There are at least three reasons for this view:

- There are pressures from consumers for pork raised under what they consider to be circumstances "friendly to animals". This has led to the banning of gestation stalls in the UK, the Netherlands, and Sweden, and restrictions on their use in Denmark, with a harder look at other standards, such as freedom of movement.
- A growing number of consumers are searching the market for pork that is certified as being raised under conditions "friendly to animals". This is not inconsistent with the notion that HACCP (Hazard Analysis Critical Control Points) programs for food safety could be expanded to include standards for animal welfare.

- There are national campaigns mounted against "factory farming". One example is the Campaign Against Factory Farming organized by the Humane Farming Association in the United States, the country that is the largest importer of Canadian hogs. The recent decision by a major US fast food outlet to source eggs from higher animal welfare production systems may be an indicator of the challenges awaiting intensive livestock operations.

These pressures are not unique to Manitoba, but we have an opportunity to lead the continent in developing alternatives. These alternatives could also advance our market opportunities.

Riparian Management

A riparian area refers to the transition zone between upland vegetation and lakes, streams, potholes and marshes – the shoreline or river bank, for example. A matter of growing concern regarding the raising of cattle on pasture is the management of these riparian areas. In essence, the concern relates to cattle having unrestricted access to riparian areas and the impact this has on water quality and wildlife habitat.

A healthy riparian zone will be well vegetated with a diverse group of plants having a variety of age classes. This vegetation protects water quality and maintains an ecological balance in the water. Riparian vegetation helps reduce stream velocity during high flow periods, thereby slowing down natural erosion. Other benefits of a healthy riparian area include: higher forage yields and improved livestock gains, improved animal health, shelter to livestock from extreme weather, recharge of underground aquifers, reduced siltation by filtering sediment, and provision of cover, food and cool water for fish and wildlife.

Improper riparian management reduces the amount of forage produced. Overuse of riparian areas can also mean that the uplands are being under-utilized. Cattle lingering in water tend to develop foot rot. Excrement in the water may expose the animals to pathogens, bacteria and viruses that would impact health and weight gain. Some algae species are known to produce toxins that are fatal to livestock if ingested. On the other hand, studies have shown that animals that have access to good quality water are more likely to drink more and graze more. This improves overall weight gain

Degraded riparian areas mean loss of wildlife and fish habitat, degraded water quality, increased presence of weeds and/or undesirable forages and reduced property values. This all translates into lower returns to livestock producers. In addition, with the recent health problems in Walkerton, livestock producers must become increasingly aware of the issue of water-borne diseases migrating to surface water or groundwater. Managing the access of livestock to riparian areas can minimize the impact of these problems.

Organizations like MHHC and the Little Saskatchewan River Conservation District have been holding field days and tours to educate and encourage cattle producers to arrange their operations to reduce or eliminate damage to riparian areas. This approach, combined with some incentive funding, is producing results. The involvement of the Manitoba Cattle Producers Association (MCPA) in coordinating and promoting better riparian management would increase the effectiveness of this programming.

Riparian areas can be rehabilitated and maintained when proper management principles are applied. These are well articulated by organizations promoting riparian management, and need not be repeated here. These suggested management practices are indicative that it isn't necessary to ban cattle from riparian areas. However, the challenge is for cattle producers to take the initiative to improve riparian management.

Recommendation:

- **The MCPA should take the lead in developing a strategic initiative for riparian management in Manitoba. This should be done in partnership with groups such as MHHC, DU, Conservation Districts, and PFRA, as well as Manitoba Agriculture and Food and Manitoba Conservation.**

Performance Bonds

Some presenters at the hearings felt that the public should not have to bear the expense of clean-up should ILO facilities, and manure storages in particular, be abandoned. Decommissioning, also, should not be at public cost. It seemed necessary to ensure that the potential environmental effects of large spills be addressed properly. If ILOs were licensed under *The Environment Act*, conditions could be built into the operating license. It is the view of the Panel that consideration be given to requiring proponents to provide evidence of financial responsibility to the province as a condition of site approval for an ILO.

In the hazardous waste industry in Manitoba, a licensed operator must file a copy of his insurance instrument with Manitoba Conservation, keeping the department informed that it is current. In the United States the EPA provides an insurance service where it is satisfied that the applicant has already diligently sought and failed to obtain private coverage against spills.

In the fast evolving intensive livestock industry, with vulnerability to major market setbacks, it is reasonable to expect some protection against sudden threats to the environment. The Panel believes a responsible operator will find this "cost of doing business" reasonable.

Recommendations:

- **Industry representatives and government should explore sources of performance bond insurance, the levels that are appropriate, and the regulations that are required to provide the public with assurance that costs of environmental problems with a specific ILO are not borne by the public.**
- **Performance bonding should be a condition of approval for new ILOs, and that such a condition for all ILOs over 300 AU be phased in over a reasonable time period.**

Demonstration Sites

Many rural councils and residents are unfamiliar with the structure and functioning of modern, large hog barns. This unfamiliarity often leads to unease and fear regarding the environmental consequences of such a barn locating in their area.

Recommendation:

- **Manitoba Pork should coordinate the development of a state of the art hog production site and manure handling facility that can test the latest techniques to improve sustainability of the hog industry and improve the in-barn environment. Such a site would play a vital role in technology transfer to current and prospective hog producers, as well as have a primary function in education of municipal councils and the general public.**

CHAPTER 8

SOCIO-ECONOMIC ISSUES

Socio-economic issues pervaded the Panel's public meetings. The diversity of views was large indeed, but the one issue that predominated was an overall concern about survival of the family farm as a way of life.

The concerns were expressed in a variety of ways. There are pressures from globalization and technological advances for farms to "get big" or "get out". Many felt there is a declining importance and influence of agriculture and farmers (even in rural areas) as farms became fewer and larger. There were concerns about how to pass the farm to the next generation. An over-arching theme was insecurity and uncertainty about the future. Although it is beyond the Panel's terms of reference to delve into all these issues, we do wish to explore some aspects as they relate to sustainable livestock development.

A key starting point is to recognize that there are many types of farms and farmers in the rural landscape, each with different characteristics and lifestyle/business objectives. Building on some of the material in Chapter 2 of this report, it is instructive to look at a more detailed classification system, or "typology", developed by Agriculture and Agrifood Canada that considers a number of factors in classifying farm types. These typologies are outlined below:

- **Pension Farms:** Main operator was 60 to 64 and receiving pension income (CPP/QPP), and all those 65 years of age and older.
- **Beginner Farms:** Main operator had less than 6 years of farming experience.
- **Lifestyle Farms:** Gross revenues of $10,000 to $49,999, off-farm income of $50,000 and over, and negative net operating income.
- **Low Income Farms:** Gross revenues of $10,000 to $49,999 and total family income below $20,000.
- **Limited Resource Farms:** Gross revenues of $10,000 to $49,999 and not in the lifestyle or low income farms.
- **Transition Farms:** Gross revenues of $50,000 to $99,999.
- **Large Farms:** Gross revenues of $100,000 to $249,999.
- **Very Large Farms:** Gross revenues of $500,000 or more.

Table 8.1 illustrates the distribution of farms in Manitoba by type and production in 1997. Farms in the two largest categories (41 percent) accounted for 68 percent of farm sales. For all of Canada, these two categories accounted for 37 percent of farms and 71 percent of farm sales. Another way of looking at this is that farms in transition, combined with farms with low farm incomes, are in the majority (59 percent), but are responsible for a smaller proportion of total farm sales (32 percent). Table 8.2 shows the financial characteristics of different farm types in Manitoba in 1997.The challenge this poses, in the view of the Panel, is to find ways for this majority group to participate in making a living in rural areas.

Table 8.1
Distribution of Farms and Production by Farm Typology, Manitoba, 1997

	# of Farms	*# of Farms*	*# of Sales*
Pension	3,400	20.1	20.8
Lifestyle	90	0.5	0.1
Beginner	835	4.9	2.8
Low Income	1,015	6.0	0.9
Limited Opportunity	2,110	12.5	1.9
Transition	2,570	15.2	5.8
Large	6,100	36.1	41.6
Very Large	795	4.7	26.0
ALL FARMS	16,905	100.0	100.0

Source: Farm Financial Survey (FFS) 1998, Whole Farm Data Base, Statistics Canada.

Note: Excludes farms with less than $10,000 in gross farm revenues. Due to rounding and/or confidentiality restrictions, percentages may not add up to 100%.

A revealing statistic is the proportion of total family income that comes from off-farm sources. For all Manitoba farms this is 43 percent; comparable numbers for Saskatchewan and Alberta are 47 percent and 63 percent. When broken down by type of farm, the differences are significant, ranging from 16 percent for very large farms to 114 percent for lifestyle farms. A number that is greater than 100 percent implies that off-farm income is used to offset negative net operating margins from farm operations.

An interesting question that the Panel has not had the opportunity to explore is to analyze the sources of off-farm income to farmers. Clearly, in the case of pension farms (about 20 percent of all Manitoba farms) where off-farm income is almost 60 percent of total family income, pensions would be a significant source. In the remaining 39 percent where off-farm income as a percentage of total family income ranged from 59 percent for beginner farms to 114 percent for lifestyle farms, it is more difficult to determine. One likely source is employment in the service, educational, and health care sectors in surrounding towns and even cities. Another source of off-farm income for some farmers may be local ILOs. A typical configuration of a two 3,000 pig sow barns, eight 2,500 pig nursery barns, and twenty-one 2,000 pig feeder barns would employ approximately 35 people. It is our understanding that many of these people come from surrounding farms, as well as rural communities and rural non-farm residences.

Table 8.2
Financial Characteristics of Farms by Farm Typology, Manitoba, 1997

	Average					
	Net Operating Income ($)	*Gross Sales ($)*	*Net Worth ($)*	*Debt/ Asset %*	*Total Off-Farm W&S ($)*	*Family Income ($)*
Pension	32,167	195,904	695,571	11.0	20,698	56,377
Lifestyle	-4,091	29,499	457,473	14.3	44,601	54,983
Beginner	24,896	106,931	236,349	26.2	28,006	44,895
Low Income	1,210	28,497	185,405	13.7	10,636	6,786
Limited Opportunity	3,705	29,388	214,035	12.7	32,129	34,287
Transition	12,919	72,757	376,999	14.0	27,726	34,511
Large	45,362	217,873	685,997	19.0	24,259	68,066
Very Large	155,197	1,047,422	2,042,168	23.1	51,814	213,880
ALL FARMS	34,348	189,192	592,648	17.3	26,731	58,429

Source: FFS 1998, Whole Farm Data Base, Statistics Canada.

Note: Excludes farms with less than $10,000 in gross farm revenues

Rural Manitoba, along with Saskatchewan and Alberta, is dependent on agricultural exports. With that dependency comes the necessity to be competitive with farmers in other countries, and the resulting pressures to adopt cost cutting and efficient means of production. Whether this is through the use of chemical fertilizers and pesticides, feed additives, innovations resulting from the "life science revolution" (for example GMOs), or increased size of operations, questions are being raised as to the appropriateness of such developments. Nowhere is this more evident than in hog production in Manitoba where the average number of pigs produced per farm each year has increased from 388 to 1,290 between 1990 and 2000, while the number of pig farms has decreased from 3,150 to 1,450 during the same period.

Why did so many of the smaller farmers get out of hog production so quickly? Some have suggested that the elimination of single desk selling in 1995 was key. Looking at the statistics (as shown in Chapter 2), however, it is evident that this steep decline was well underway by the time this policy change took place. It has also been suggested that smaller farmers are having a more difficult time marketing directly to packers. Yet another speculation revolves around quality of life expectations. The raising of pigs requires close attention seven days a week. For a small producer without hired help there is little opportunity for time away from the farm.

The options appear to be to either get larger and have more people working on the farm, or leave the business. Apparently, some of the farmers that have stopped producing their own pigs have gone to work for intensive pig operations where they have the opportunity to enjoy more time away from work.

The challenge facing government (both provincial and federal) is to promote rural development in a sustainable manner. This requires recognition that there is more to rural Canada than primary agriculture, particularly grain production, practiced in traditional ways. Other sectors in rural and urban areas have had to change in response to changing markets and technology. Perhaps the most difficult realization is that farms that are entirely dependent on the export grain market are not likely to be sustainable in the long run.

We believe that ILOs can play an important role in sustainable rural development, provided that compliance with environmental regulations is monitored and enforced, and that the human and animal health implications of these systems of production are also monitored.

However, we do not subscribe to the view that they are the only approach to livestock growth in rural Manitoba. One of the challenges is to find ways for farmers that do not wish to participate in ILOs to still be able to produce and market their animals and make a living. To do this will require a shift away from the traditional approach to agricultural policy that tries to treat all farmers equally, usually through safety net programs that appear to satisfy few. Keeping in mind the farm typologies mentioned earlier, we believe that two sets of agricultural policies are required to achieve this.

Governments should focus one set of agricultural policies, including appropriate safety net programs, on the two categories of farmers that encompass large and very large farms. Typically, these are the operators that will be concentrating on producing at least cost for the export market.

Another set of agricultural policies should be developed that will deal with the needs and expectations of farmers who are in transition or derive limited income from farming. In the case of sustainable livestock development, this could be targeted at grain producers wishing to shift into hog or cattle production, but do not want to go the large scale route. They will require a different approach to financing, research for appropriate technology, extension, marketing and safety net programs. More emphasis could be placed on land use policies that would take account of the land resource having value for more than primary agricultural production, for example wildlife habitat and ecotourism.

Research for appropriate technology requires a special mention. Over the last decade or more, governments (both federal and provincial) have

been emphasizing industry driven and cost-shared research initiatives. Not surprisingly, this has shifted the emphasis to research that would be of most benefit to agribusiness and larger farmers, with smaller farmers not being in a good position to raise research funds for cost sharing. If government wishes to provide an opportunity for rural development that isn't driven solely by large scale agriculture, more emphasis needs to be placed on research appropriate for smaller farmers.

Recommendation:

- **In light of socio-economic concerns about livestock expansion, the Government of Manitoba should take a two-pronged policy approach to encouraging sustainable livestock development in Manitoba:**
  - **For large scale livestock operations, monitor and enforce environmental and health regulations with a view to enabling these farms to be competitive in export markets while ensuring environmental stewardship**
  - **For farmers in transition and those who currently derive limited income from farming, develop a package of programs that will enable these farmers to adjust their farming operations to a level that will provide them with an acceptable quality of life. This could also include a greater focus on higher animal welfare production systems.**
- **The Government of Manitoba should initiate a research and development program aimed at identifying technology and management practices appropriate for smaller farmers; such a program should not be predicated on cost sharing.**

CHAPTER 9

INFORMATION SYSTEMS AND RESEARCH

The view that the Panel's recommendations should be based on science and sound information was heard frequently at the hearings. The term "scientific research" was often used in discussions about the management of ILOs and their impacts on the environment. The phrase seems to reflect a consciousness that intensification carries with it new risks which are likely to be incurred to both the sustainability of resources and the well-being of Manitobans. The phrase also seems to carry a certain unease - that we are now dealing with "unseens" and "unknowns" which, while always present in agriculture, had now better be measured and contained. In the minds of many citizens, all cannot necessarily be deemed well, even if the animal gains weight!

The Panel identifies some research priorities below, which follow from its deliberations. What follows is not strictly research in an academic sense of the term. It includes the collection and assembly of information and data upon which research can be based or action taken, some development suggestions, demonstration possibilities, and scientific investigation under strict protocol. The interested reader is referred to the Panel's separate technical report that includes Ross Bulley's detailed summary of the research round tables and more specific research suggestions. We appreciate the generous help we received from the organizations that undertake major research efforts, as well as the helpful views expressed at the research round tables

Information Systems and Database

One of the Panel's first surprises was learning that a centralized database detailing the location, scale, and history of livestock operations in rural Manitoba does not exist. The information contained in manure management plans has not been used to its potential for providing useful trends.

Throughout the public hearings, presenters with widely differing views called for the establishment of such a database, perhaps in a GIS (Geographic Information System) format. This database might contain detailed information on each production unit, and include monitoring and compliance data on production units specifically, and its effects on the surrounding area. In addition, it should contain all available data on the province's geography and resources, such as groundwater and soils. Several presenters asked that such a database be openly available. We were also told that the results from monitoring or compliance inspections are typically not being sent to either the concerned parties or to municipalities.

An information system is necessary to provide Manitobans with a means for more accurately tracking the environmental effects of present and future livestock operations (as well as other industrial operations that might impact on water quality), and should build public confidence in the ability of livestock operations to function in a sustainable manner. It should also include, or be run in tight conjunction with, the openly accessible database to track the safety of the province's drinking water as recommended by the Drinking Water Advisory Committee.

Much of the data necessary for the construction of such a system is currently being collected and held by a number of agencies. For example, the federal and provincial governments hold environmental monitoring information, as do Manitoba's universities. The Canadian Science Centre for Human and Animal Health in Winnipeg, in cooperation with Manitoba Pork, has gathered some information on the location of pork production sites, primarily to monitor the potential spread of animal diseases. PFRA is working with a number of municipalities to assemble local databases to plan for the best possible location of future livestock operations. The Riding Mountain Biosphere Reserve is currently mapping livestock operations in the

municipalities surrounding Riding Mountain National Park for the purposes of livestock disease tracking. GIS data, including recent aerial photography and satellite imagery, and soil, surface water and groundwater maps, are also held by the Surveys and Mapping Branch of Manitoba Conservation.

The challenge is to rise above "turf and ownership" issues and for organizations to cooperate in putting together an effective information system.

Recommendation:

- **The Government of Manitoba should accumulate all relevant data concerning livestock operations in a central openly available information system in a GIS format to provide Manitobans with a realistic assessment of the sustainability of current operations and their effect on both the local and provincial environments.**

Environmental Stewardship Research

Based on what we have learned from our observations during the course of this review, the Panel offers a tenuous perspective on research and its application to ILOs. There is risk that we may be perceived as "instant experts"!

Market forces drive the improvement of breeds, the improvement of feed and weight gain, the number of piglets per sow, the health of animals and the minimization of losses, and similar effects in a fairly direct manner. It can be expected that a tight, interactive link will be maintained between operators and researchers, backed up by industry organization without much intervention by a third party such as government. There are exceptions – such as the use of antibiotics and the persistence of pathogens, for example - which seem to call for control on public health grounds. In general, however when one is focused on the animal and the bottom line, the industry needs little prodding to support and adopt new techniques, as will certainly be the case as the consumer exerts pressure to change the method of housing of hogs.

This is not necessarily the case, however, in the environmental stewardship component of sustainable livestock development. Despite the research done by PAMI and others, and what appears to be a keen sense of the need for precise nutrient control, the task of spreading manure is often done in an inaccurate manner, employing outdated methodology. In our view the skills and knowledge associated with soil testing, metered delivery, knowledge of nutrient residuals, crop needs, timeliness of application, and mechanical ability warrant consideration for specialized training and formal trade certification.

Government, which has prime responsibility to assure safe environmental performance, has the propensity to rush to economic benefits, and then struggles to catch up and mitigate impacts. We are scaling up the potential insults to Manitoba's environment. We should no longer rely upon its vastness and abundance to protect us. Government needs to speed up its investigative capability, and become intimately acquainted with all the research in the ILO arena, financially encourage research on topics where greater knowledge is needed, and tune up its environmental control.

Recommendation:

- **Government should maintain a pro-active role and sustained leadership in mounting research related to environmental stewardship. It should be prepared to read signals (such as the consequences of climate change) and "blue-sky" and "what if". It should have strong regard for the precautionary principle.**

How Much Manure?

The Intent of manure management is to apply manure to the field at a rate that will result in the nutrient being taken up by the subsequent growing crop. At the same time, in an ideal situation, the residual run-off would be non-existent or, at worst, minimal. However, to be effective, knowledge is required about the

nutrient content of the manure to be spread, the nutrient level in the receiving soil, and the needs of the crop. Undoubtedly, there is a lot of averaging and estimating, and relatively few soil tests, because current testing methods are time consuming and inconvenient in the regime of the production unit. As well, notwithstanding agitation of the manure in storage, the consistency and nutrient content of the product being delivered is variable.

Clearly, there is a pressing need for accelerated development of portable nutrient measurement tools. One can visualize the farmer with a device to be plunged into the soil, providing instant read-out, rather than a vehicle full of drilling equipment, core storage and instrumentation to test the cores. This would be a further step forward. Near infrared spectroscopy can provide a continuous measure of nutrient content in hog slurry. There are prospects for its use in precision farming when coupled with Global Positioning System (GPS) technology.

Recommendation:

- **Research should be encouraged into the development of portable manure nutrient measurement equipment.**

How Safe Are Earthen Manure Storages?

The Panel shares the view of several presenters that we should not assume that earthen storages are safe and will perform well for many years. This is not to say that carefully constructed pits should be replaced by other structures. Rather they concentrate our attention on the "newness" of the infrastructure that accompanies ILOs. Regular inspections and monitoring are essential.

Recommendation:

- **Research into the application of electromagnetic spectrometry (EMS) to detect leakages in manure storages, already being tested in the field by PFRA, should be extended to support a strong monitoring and inspection effort. Further, an EMS profile of each new manure storage facility should be obtained as a baseline before its initial filling.**

Can Odor be Measured?

Setback distances, particularly between a hog operation and its neighbors as suggested in the *Farm Practices Guidelines*, are designed to meet the practicalities of the Manitoba landscape rather than the results of a careful study of odor as a nuisance to neighbors. Indeed, an odor meter that is wholly objective (i.e. avoids human opinion on how much stink is generated) is not likely to be developed because of the chemical complexity of odor. Improvements to siting criteria that aid municipalities are likely to come from studies such as that of DGH Engineering and the University of Laval which involves interviews of large numbers of people living around many barns as to their experience with odors. Our recommendation ties back to the collection of information — in this case, the documentation of experiential data applicable to the Manitoba environment.

Recommendations:

- **A systematic study should be made of the experience of Manitobans living near ILOs with a view to improving the criteria upon which municipalities base siting decisions.**
- **The Farm Practices Guidelines should strongly stress the uncertainties in general recommendations on setbacks and the need for very careful on-site assessments.**

Do We Have a Handle on Run-off?

We believe that not enough is known about the real effect of the application of manure to soils or the quality of water that leaves the field during spring run-off or floods and arrives at the receiving waters. In parallel with the suggestion that a state-of-the-art hog production facility be developed for providing information and familiarity with research findings, and new techniques, the Panel also feels that the quality of runoff

water from fields with and without manure application should be studied.

Recommendation:

- **A long-term study should be initiated on the behavior and quality of water (including nutrients and pathogens) running off fields in a natural state and those fertilized with livestock manure and/or inorganic fertilizers, and that this research be tailored to demonstrating the results to the public.**

Health of Animals

In Chapter 6, research is recommended on pathogens and pathogen control, and continued examination of the ways in which the in-barn environment impacts workers. In Chapter 7, we point to the need to accelerate research into animal welfare, making the point that customers are watching the methods of production.

Recommendations:

- **Research should be conducted on the impact of air quality on animal health and production to indicate the financial benefits of maintaining clean air and less odor through nutritional management and different feeding strategies.**
- **Research should be conducted into animal housing in ILOs, with a view to more closely matching the inclinations of the animal to enhance the acceptability of animal confinement in the public mind.**

You Can Take a Horse to Water, AND You Can Make Him Drink!

The Panel visited several livestock operations at the generous invitation of their managers. These visits provided valuable insights for the preparation of this report. The Panel is genuinely impressed with the many operators who keep abreast of new developments in research and its practical application. We have become advocates of demonstration projects that are managed by researchers, and with opportunities arranged for participants in industry to meet face-to-face with those operators who have tested research findings in their day-to-day programs. It is important that hard-nosed scientific opinion is always available to critique field applications.

Recommendations:

- **The livestock industry and provincial government should re-examine and increase their communication and extension efforts with a view to heightening the awareness of improved technologies and management approaches derived from research and development.**
- **Government, having eased the means by which data is accessed, should organize its tasks in such a way that competent specialists are on call to consult with both ILO and smaller operators, or point them in useful directions. Such a service should be particularly useful to new entrants to the livestock industry.**

CHAPTER 10

SYNTHESIS AND SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

This chapter brings together the various conclusions and recommendations found in this report. It builds on the sustainable livestock development principles outlined earlier, synthesizes some key conclusions, and summarizes the main recommendations.

Sustainable Livestock Development Principles

Sustainable livestock development consists of three inter-related components: economic viability, environmental stewardship, and social and equity issues.. Our challenge, indeed the challenge for everyone with an interest in the livestock sector, is to identify policies, guidelines and regulations that will enable us to expand Manitoba's livestock sector in ways that take into account the concerns in all three components. Solutions that deal with only one of these components and don't recognize the others simply won't be acceptable to Manitobans. In other words, we must "find common ground".

The concept of sustainable livestock development requires an identification of some principles. The principles that have guided the Panel in reaching its conclusions and developing its recommendations are outlined below:

- Economic, environmental and social considerations must be integrated in public and private decision making.
- The concept of stewardship is paramount; that is, today's decisions must be balanced with tomorrow's impacts.
- The long term productive capacity and quality of our natural resources must be maintained.
- Economic returns from production should enable an adequate standard of living to be maintained; furthermore, it should be sufficient to continue to attract replacement farmers.
- Economic activity should not detract from human health or the quality of land and water; a balance must be struck between the size of production units consistent with technology and a social structure acceptable to all stakeholders.
- Science based information must be an integral part of public and private decision-making. Where that information is inadequate, government and the private sector have a responsibility to support appropriate research activities.
- Means to ensure that the results of the research are effectively communicated to farmers and decision-makers also are necessary.
- Adequate resources must be allocated to monitor and enforce compliance with regulations and standards.
- There must be sufficient transparency to stakeholders in the production, processing and regulation of the livestock industry to instill confidence that Manitoba's food is being produced in a safe and sustainable manner.

Synthesis of Key Conclusions

Many conclusions were drawn throughout the report. What follows is a synthesis of key themes.

- Public apprehension about ILOs is being driven by several factors: experiences in other jurisdictions, declining familiarity with what is happening on farms, the occasional local "horror story", and the perception of insufficient monitoring of ILOs.
- The government is seen as the custodian of public interest in the environment. The public

needs to be confident that government is ensuring that "things are being done right", and must have access to information to be assured of this.

- Current regulations and guidelines for ILOs, for the most part, are adequate; however, monitoring and enforcement are not.
- Progress towards sustainable livestock development in Manitoba must be based on reliable information, and not emotion. This information should be drawn from research and practical experience, and must be relevant to the Manitoba situation.
- It is important to recognize that there are two broad types of farms: large commercial farms that produce primarily for export, and farms that derive limited income from agriculture or are in transition. The same policies and regulations will not work for both groups.
- Although much of the Panel's focus has been on hogs, we believe that beef production in Manitoba is sustainable, providing the issues of riparian management and processing capacity are addressed.
- Manure is a valuable product, capable of replacing expensive inorganic fertilizer and improving the soil, and should not be treated as a waste.
- The Panel believes that expansion of ILOs can be sustainable in Manitoba, provided that government follows the recommendations contained in this report.

Synthesis of Key Recommendations

The Panel has identified four key recommendations that are critical to achieving sustainable livestock development in Manitoba. These are followed by a series of supporting recommendations.

Role of Provincial Government in Sustainable Livestock Development

Of the 40 or so recommendations presented in this report, about two-thirds address the involvement of the provincial government directly in the intensive livestock industry. It is not surprising, therefore, that the overarching recommendation from the Panel stresses the need for the commitment of staff and financial resources to be devoted to two tasks: first to gain a full understanding of the present situation of such operations in the overall milieu of agriculture in the province, and secondly, to provide a regulatory framework and a monitoring and enforcement effort in which expansion can take place without damage to Manitoba's people or environment.

In this regard, the Panel **strongly recommends** that:

- **Government focus substantially increased resources on the intensive livestock industry in Manitoba to provide analysis, guidance, inspection, monitoring, enforcement and technological assistance that can accommodate the present scale of the industry and anticipate its expansion.**
- **Capability to undertake comprehensive analysis of the potential impact of new or expanded ILOs upon both local and larger area environments should be enhanced immediately in order to lead to strong critical decisions.**
- **Government develop and make public the policy framework through which livestock expansion will take place, stressing its concern for sustainability.**

Publicly Available Information

Policies for the future are shaped by past experience, knowledge of present circumstances, and reliable information. This reliable information must be available not only to government and industry, but also to the concerned public.

The Panel **recommends:**

- **The Government of Manitoba should accumulate all relevant data concerning livestock operations in a central openly available information system in a GIS format to provide Manitobans with a realistic assessment of the sustainability of current operations and their effect on both the local and provincial environments.**

Role of ILOs in Rural Development

The provincial government is challenged to promote rural development in a sustainable manner. The Panel believes that ILOs can play an important role in rural development through generation of employment and income, but they should not be seen as the only option. Farmers who wish to produce and market animals without going the ILO route should be assisted.

The Panel **recommends:**

- **In light of socio-economic concerns about livestock expansion, the Government of Manitoba should take a two-pronged policy approach to encouraging sustainable livestock development in Manitoba:**
  - **For large scale livestock operations, monitor and enforce environmental and health regulations with a view to enabling these farms to be competitive in export markets while ensuring environmental stewardship**
  - **For farmers in transition and those who currently derive limited income from farming, develop a package of programs that will enable these farmers to adjust their farming operations to a level that will provide them with an acceptable quality of life. This could also include a greater focus on higher animal welfare production systems.**

Decision Process for Siting ILOs

The Panel regards a carefully considered decision on the siting of ILOs to be of prime importance in sustainable livestock development, particularly in protecting the environment. It is essential that local circumstances, especially as pertaining to land use, be very thoroughly thought through. It is also essential that the province, being in a better position to assess environmental factors in depth on a larger area basis, have a say in the siting of ILOs.

The Panel therefore **recommends:**

- **New and expanding ILOs should require formal approval by both the host municipality for compliance with land use by-laws, and the province for environmental impact before construction is allowed to begin.**

Supporting Recommendations

What follows is a summary of supporting recommendations that are grouped according to topics in previous chapters.

Planning for Sustainable Livestock Development

- New and expanding ILOs should not be permitted in municipalities lacking land-use zoning by-laws until such by-laws have been formally adopted.
- The provincial government should designate or appoint an appropriate Board or Panel empowered to investigate and rule on an appeal of a provincial decision to allow or disallow the establishment of any new or expanding ILO in Manitoba, and that the decision of that Board or Panel be final.
- The province should recognize the value of GIS and act promptly to find the means to facilitate its use as a planning tool in municipal government as well as in provincial government departments and agencies that need alternative approaches to the exercise of their mandates.

Water Quality

- Water quality monitoring must be greatly increased to provide an assessment of the impact of livestock production on soil and water. A critical constraint to achieving this is the inadequate level of staffing for monitoring.

- Additional enforcement effort is required to ensure compliance with current regulations, particularly concerning manure management and storage, and penalties for infractions must be increased.
- The province should move toward regulating manure application according to phosphorus content of soil and manure, and future ILOs should be located in order to provide sufficient acres for manure application according to phosphorus content.
- The province should continue to implement the recommendations of the recently released Drinking Water Advisory Committee Report, especially recommendations for a drinking water coordinating center that is properly staffed and supported.

Threshold Level for Regulation of ILOs

- The calculation of animal units should be cumulative across species.
- In view of the lower threshold level in other provinces and some municipalities in Manitoba, the Livestock Manure and Mortalities Regulation should be modified to require manure management plans for all new and existing operations of 300 AUs or more, and that winter spreading of manure be prohibited for all new and existing operations above 300 AU.
- This reduction should be phased in over a reasonable period and should be coupled with an expanded monitoring effort, expert advice, and, possibly, incentives to encourage revamped manure management structures.

Health Issues

- Strong research and development emphasis should be placed on the monitoring of pathogens and the mechanisms by which they are transferred from animals to humans, and upon factors such as the design of barns, manure storages, and spreading practices that minimize such transfer.
- Government, in conjunction with the industry, review the in-barn environment with a view to:
  - establishing a monitoring regime and ensuring compliance with existing regulations, especially those affecting the health and safety of workers,
  - assessing the training needs of barn workers, and
  - identifying research priorities which bear upon the health of operators, workers and the nearby public.
- All barn workers should be strongly encouraged to wear proper masks.
- Greater attention should be paid by the industry and government to familiarizing the public with the in-barn environment and precautions that are taken to raise healthy animals.
- As a matter of responsibility to Manitobans, government and the industry should make clear why and how the industry uses antibiotics.

Livestock and Climate Change

- The Government of Manitoba should give serious consideration to accelerating the process of making the public generally, and the agriculture sector particularly, aware of the impacts of climate change, and the range of measures for mitigating and adapting to climate change.

Manure Management

- Educational institutions, in cooperation with industry and government, should re-assess the training requirements for professionals and technicians in the nutrient management field.
- The provincial government should move towards the formal certification of commercial nutrient applicators.
- For reasons of odor control, reducing greenhouse gas emissions, and maximizing nutrient capture, ILOs should be encouraged to implement covered manure storage and injection.

Riparian Management

- The Manitoba Cattle Producers Association should take the lead in developing a strategic initiative for riparian management in Manitoba. This should be done in partnership with groups such as Manitoba Habitat Heritage Corporation, Ducks Unlimited, Conservation Districts, and PFRA, as well as Manitoba Agriculture and Food and Manitoba Conservation.

Performance Bonds

- Industry representatives and government should explore sources of performance bond insurance, the levels that are appropriate, and the regulations that are required to provide the public with assurance that costs of environmental problems with a specific ILO are not borne by the public.
- Performance bonding should be a condition of approval for new and expanding ILOs, and that such a condition for all ILOs over 300 AUs be phased in over a reasonable time period.

Demonstration Sites

- Manitoba Pork should coordinate the development of a state of the art hog production site and manure handling facility that can test the latest techniques to improve sustainability of the hog industry and improve the in-barn environment. Such a site would play a vital role in technology transfer to current and prospective hog producers, as well as have a primary function in education of municipal councils and the general public.

Research

- Government should maintain a pro-active role and sustained leadership in mounting research related to environmental stewardship. It should be prepared to read signals (such as the consequences of climate change) and "blue-sky" and "what if". It should have strong regard for the precautionary principle.
- Research should be encouraged into the development of portable manure nutrient measurement equipment.
- Research into the application of electromagnetic spectrometry (EMS) to detect leakages in manure storages, already being tested in the field by PFRA, should be extended to support a strong monitoring and inspection effort. Further, an EMS profile of each new manure storage facility should be obtained as a baseline before initial filling.
- A systematic study should be made of the experience of Manitobans living near ILOs, with a view to improving the criteria upon which municipalities base siting decisions.
- The Farm Practices Guidelines should strongly stress the uncertainties in general recommendations on setbacks and the need for very careful on-site assessments.
- A long-term study should be initiated on the behavior and quality of water (including nutrients and pathogens) running off fields in a natural state and those fertilized with livestock manure and/or inorganic fertilizers, and that this research be tailored to demonstrating the results to the public.
- Research should be undertaken on the impact of air quality on animal health and production to indicate the financial benefits of maintaining clean air and less odor through nutritional management and different feeding strategies.
- Research should be conducted into animal housing in ILOs, with a view to more closely matching the inclinations of the animal to enhance the acceptability of animal confinement in the public mind.
- The Government of Manitoba should initiate a research and development program aimed at identifying technology and management practices appropriate for smaller farmers; such a program should not be predicated on cost sharing.

You Can Take a Horse to Water, AND You Can Make Him Drink!

- The livestock industry and provincial government should re-examine and increase their communication and extension efforts with a view to heightening the awareness of improved technologies and management approaches derived from research and development.

- Government, having eased the means by which data are accessed, should organize its tasks in such a way that competent specialists are on call to consult with both ILO and smaller operators, or point them in useful directions. Such a service should be particularly useful to new entrants to the livestock industry.

Concluding Comment

The Panel is convinced that "common ground" can be found for sustainable livestock development in Manitoba. It will require a commitment by the provincial government and the livestock industry to deal with many concerns about the impact of livestock on Manitoba's environment and rural landscape. It will also require a greater willingness on the part of opponents of the livestock industry to recognize that sustainable livestock development is not inherently bad. We believe our report contains recommendations and suggestions that can be used by all to find the "common ground"

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APPENDIX A

List of Presenters at Public Meetings of the Livestock Stewardship Panel

NAME	ADDRESS	ORGANIZATION
Abas, Boyd	Arborg	People for the Preservation of Interlake Agriculture
Abbe, Phyllis	Winnipeg	
Alexander, Don	Miami	Pembina Valley Conservation District
Arklie, Hugh	Dugald	
Baird, Bob	Cloverdale	
Baker, Frank	Winnipeg	
Bannister, John	Lockport	
Baron, Alan	Carberry	
Bazinet, Doug	Steinbach	Private Veterinary Practice
Bear, Jim	Winnipeg	South East Tribal Council
Beever, Marlin	Rivers	Rural Municipality of Daly
Bergman, Kay	Arnes	
Bisson, Cynthia	Brunkild	
Bjarnason, H. and D. Jayas	Winnipeg	University of Manitoba
Blixhaven, Jeff	Killarney	
Boguski, Lorne	Roblin	Town of Roblin
Brookes, David	Grunthal	
Brunet, J.	Winnipeg	Save Our Seine
Buchanan, Lloyd	Winnipeg	Manitoba Cattle Producers Association
Burns, Vicki	Winnipeg	Winnipeg Humane Society
Burton, David	Winnipeg	University of Manitoba
Campbell, Scott	Teulon	
Cerilli, Albert	Winnipeg	Manitoba Federation of Union Retirees
Christian, Mel	Woodlands	
Church, Kerry	Niverville	Puratone Corporation
Clegg, Carol	Seven Sisters	
Connor, Laurie	Winnipeg	University of Manitoba
Dalgarno, Bruce	Newdale	
Dalmyn, Ron	Winnipeg	Provincial Coalition for Responsible Resource Management
Daman, Gordon	Niverville	Town of Niverville
Dann, Harvey	Winnipeg	Alert Agri-Distributors
D'Athe, Claire	Carberry	
Deleurme, Ray	Alberta	
DePrez, Paul	Winnipeg	
Dewar, Don	Dauphin	Keystone Agricultural Producers
Dobrowolski, Doug	Sanford	Rural Municipality of Macdonald
Driedger, John	Steinbach	Rural Municipality of Hanover
Dube, Gerard	La Broquerie	
Dzisiak, Chris	Dauphin	Prairie Mountain Swine
Elliot, Jim and Cam Brown	Winnipeg	
Ewacha, Curtis	Winnipeg	

Ewacha, Terry	Middlebro	
Fast, Fred	Niverville	
Fridfinnson, Donalda	Arborg	Interlake Development Corporation
Floyd, Lorne	Arborg	
Flemming, Elizabeth	Winnipeg	Provincial Council of Women
Foster, Ken	Arborg	
Friesen, Brad	Altona	
Friesen, Gerry	Wawanesa	Manitoba Pork Marketing Cooperative
Friesen, Peter	St. Malo	Rural Municipality of Franklin
Froese, Harold	Winnipeg	Manitoba Egg Producers
Froese, Peter	Steinbach	South East Soil Conservation Organization
Gagne, Gabriel	La Broquerie	
Gehrer, Uli	Landmark	
Geisel, George	Ochre River	
Gendreau, Luc	Menisino	
Gibson, Janine	Steinbach	
Giesbrecht, Alayna	Winnipeg	Manitoba Farm Animal Council
Giesbrecht, John	La Broquerie	Rural Municipality of La Broquerie
Giesbrecht, Ken	Steinbach	Barkman Concrete
Gonyou, Harold	Saskatoon SK	Prairie Swine Centre
Gottschaulk, T and D. Wain	Winnipeg	Sturgeon Creek Association
Grauer, Hermann	Steinbach	
Graydon, C. and A. Grenier	Dominion City	Stuartburn/Piney Agricultural Dev. Assoc.
Green, Betty	Fisher Branch	
Guetre, Lee	Ste. Anne	Rural Municipality of Ste. Anne
Hacault, Anastasia and Marcel	Niverville	
Hacault, Marcel	Niverville	Manitoba Pork Council
Hamblin, Chris	Morris	Keystone Agricultural Producers
Hargraves, Jim	Brandon	Pro-Gilt Ltd.
Harrison, Bill	Altamont	Roseisle Creek Watershed Assoc.
Hedges, Roy	Hodgson	
Heeney, Dennis	Forrest	Rural Municipality of Elton
Hiltz, Wayne	Winnipeg	Dynamic Pork Corporation
Holland, John	Dugald	Rural Municipality of Springfield
Holloway Family	Sperling	
Jacobson, Les	Arborg	Manitoba Rural Adaptation Council
Jacobson, Robert	Arborg	
Lewis, Jeff	Detroit Lakes MN	Minnesota Pollution Control Agency
Johnson, Byron	Killarney	B & R Feeders Ltd.
Johnson, Kendall	Brandon	JCI Service
Johnson, Ron	Arborg	Keystone Agricultural Producers
Jones, Alvin	Killarney	Fine Swine
Kaastra, Renske	Winnipeg	Manitoba Women's Institute
Kattenburg, David	Brandon	
Kaus, Andrew	Arborg	Arborg - Bifrost Community Development Corp.
Kehler, Betty	Teulon	
Kell, Robert	Grunthal	
Kelly, Brian	Winnipeg	Manitoba Chambers of Commerce
Kemp, Art	Pilot Mound	

Kindzierski, Bert	Arborg	Town of Arborg
King, Dave	Arborg	
Kirouac, Roland	Steinbach	Farm Credit Corporation
Klassen, Waldie	Winnipeg	Manitoba Chicken Producers Board
Kleinsasser, D. and J. Hofer	Winnipeg	Concord Colony/Starlight Colony
Kleinsasser, Jonathan	Ste. Agathe	Crystal Springs Colony
Klippenstein, Rick	Morden	Rural Municipality of Stanley
Kolano, G. and L. Filsch.	Sundown	Keystone Agricultural Producers
Kopelow, Lorna	Dugald	
Koroluk, Glen	Winnipeg	Hogwatch
Kristjanson, Robert T.	Gimli	
Kroeker,Don	Winkler	Kroeker Farms Ltd.
Kroeker, Tim	Landmark	Landmark Chamber of Commerce
Kuca, Drago	Winnipeg	
Kynoch, Karl	Baldur	Manitoba Pork Council
Laliberte, Garland	Winnipeg	Manitoba Manure Management Initiative
Laudin, Alfons	Brunkild	
Lawrence, Bernie	Brandon	Elite Swine
Leschyshyn, Joe	Chatfield	
Liebzeit, Frank	Winnipeg	
Loewen, Cliff	Landmark	
Loewen, Curt	Steinbach	Loewen Do-It Centre
Loyns, Al	Winnipeg	Prairie Horizons
Lugzo, Immy	Middlebro	
Mackay, David	Warren	
Mackling, Al	Dugald	
Maire, Margaret	Winnipeg	
Malley, Diane	Winnipeg	PDK Projects Inc.
Manchur, David	Gilbert Plains	
Martens, Don	Winkler	Winkler Feed Service
Martin, Doug	Selkirk	South Interlake Land Management Association
Martin, J.	Winnipeg Beach	
Marvin, Bob	Warroad, MN	City of Warroad, Minnesota
Marykuca, Peter	Arborg	
May, Elaine	Killarney	
McDowell, Gary	Brandon	Brandon Economic Development Board
McEwan, L. and G. Orchard	Altamont	Deerwood Soil & Water Association
McPhee, Gordon	Dauphin	Keystone Agricultural Producers
Meijer, Rob	Winnipeg	Canadian Federation of Independent Business
Milne, Mark	Winkler	K-Line Pigs Ltd.
Morton, Peggy	Broad Valley	
Motherall, Wayne	Portage la Prairie	Association of Manitoba Municipalities
Mowbray, Tom	Cartwright	Rural Municipality of Roblin
Muldrew, Cec	Victoria Beach	
Newton, Weldon	Neepawa	Keystone Agricultural Producers
Nichol, Wayne	Killarney	Rural Municipality of Turtle Mountain
Pakulak, Ed	Fork River	
Paton, Bill	Brandon	Brandon University
Penner, Dave	Landmark	Elite Swine

Penner, Dennis	Steinbach	Manitoba Pork Marketing Cooperative
Penner, Reg	Blumenort	Penner Farm Service
Penner, Wayne	Morden	
Perry, Reg	Arborg	Arborg & District Chamber of Commerce
Peters, Eric	Steinbach	
Peters, Rick	Blumenort	Steve's Livestock Trucking
Petkau, Art	Morden	Manitoba Cattle Producers Association
Petkau, Don	Portage la Prairie	Prairie Agricultural Machinery Institute
Peto, Beth	Winnipeg	Choices
Pip, Eva	Winnipeg	University of Winnipeg
Pizey, Bob	Teulon	
Plohman, Garry	Niverville	Elite Swine
Pluman, Desmond	Grunthal	Grunthal Auction Mart
Poiron, Claude and Roland	Somerset	
Price, Jeff	St. Francois	Rural Municipality of St. Francois Xavier
Pryzner, Ruth	Alexander	
Puchailo, Sid	Grandview	Rural Municipality of Grandview
Rajotte, Gordon	Dauphin	Philosophy Practitioners Institute
Rankin, Darrell	Winnipeg	Communist Party of Canada
Redekop, Doug	Landmark	
Redfern, Ray	Brandon	Brandon Economic Development Board
Reimer, Heintz	La Broquerie	
Reimer, Del	Steinbach	Manitoba Pork Council
Reimer, Dwight	Steinbach	City of Steinbach
Rempel, Eric	Steinbach	Ecologic Inc.
Rempel, Ken	Arborg	Arborg Feeds
Rempel, Ken	Landmark	Landmark Feeds
Rempel, Margaret	Ste. Anne	
Riley, Anthony	Strathclair	
Roberts, Cheryl and Vance	Glenwood	
Roguson, Al	Brandon	
Rutherford, Jack	Grosse Isle	
Rutherford, Randy	Grosse Isle	
Sanders, Odile	Altamont	
Sawatzky, Wilf	La Broquerie	
Schmidt, Garth	Steinbach	Canadian Bankers Association
Schonoenbach, A.	Sprague	
Sigvaldson, Scott	Arborg	
Singleton, Robert	Brandon	City of Brandon
Sirski, Ernie	Dauphin	Manitoba Canola Growers Association
Sissons, Don	Carman	Manitoba Pulse Growers Association
Small, Doug	St. Andrews	DGH Engineering
Smith, Al	Killarney	Dynamic Pork
Smith, Dale	Snowflake	
Smith, Linda	Steinbach	
Smith, Robert	Steinbach	Private Law Practice
Somerville, Sandra	Winnipeg	
Sopuck, Tim	Winnipeg	Manitoba Habitat Heritage Corporation
Styre, Wilfred	Woodridge	

Swan, Bill	Winnipeg	Manitoba Milk Producers Marketing Board
Syme, Robert	Winnipeg	Microbex Ltd.
Tait, Fred	Riverdale	National Farmers Union
Tetrault, Denis	La Broquerie	La Broquerie Economic Development Committee
Thiessen, Dennis	Steinbach	
Tolton, Gary	Newdale	
Trotter, Dan	Brandon	Brandon Chamber of Commerce
Trudeau, Jacques	Ile des Chenes	
Unger, Kevin	Steinbach	Unger Excavating
Uruski, Bill	Arborg	
Vaags, Bill	Dugald	Canada Pork International
Verbrugge, James	Beausejour	Manitoba Sustainable Agriculture Association
Vielfaure, Albert	La Broquerie	
Vielfaure, Paul	La Broquerie	Hytec Feeds Cooperative Ltd.
Waddell, Terry	Brandon	Assiniboine Community College
Waldner, Dave	Morris	Manitoba Pork Marketing Cooperative
Walker, Larry	Miniota	Rural Municipality of Miniota
Wanke, David	Menisino	
Warnez, Sandra	Killarney	Town of Killarney
Whitaker, Iain	Winnipeg	
White, Gord	Hartney	Pro-West Pork
Youngman, John	Winnipeg	Winnipeg Humane Society
Zarow, Don	Winnipeg	
Zhang, Qiang	Winnipeg	University of Manitoba

APPENDIX B

Written Submissions to Livestock Stewardship Panel

NAME	ADDRESS	ORGANIZATION
Ackerman, Joe	Winnipeg	
Aubin, Eric	Ottawa	Canadian Pork Council
Baker, Rick	Neepawa	
Bayomi, Dennis	Winnipeg	
Borst, Hans	Winnipeg	Manitoba Milk Producers
Bouchard, Darren	Lab Broquerie	
Braidek, Sheila	Winnipeg	MFL Occupational Health Centre Inc.
Buckley, Brenda	Nesbitt	
Buckley, Cathy	Brandon	Agriculture and Agrifood Canada
Campbell, Norm	Brookdale	
Carlisle Family	Carroll	
Chambers, Allan	Arnes	
Chatwin, Dianne	Miami	Rural Municipality of Thompson
Cochrane, Blaine	Brandon	
Connor, Laurie	Winnipeg	University of Manitoba
Delichte, Maurice	St. Alphonse	Delichte Holsteins
Derenchuk, Craig	Winnipeg	
Dewar, Donald	Dauphin	Keystone Agricultural Producers
Dickson, Barb	Killarney	
Eilers, Robert	Winnipeg	Agriculture & Agri Food Canada
Ewanek, John	Selkirk	Manitoba Agriculture & Food
Falk, Jason	Niverville	
Finnson, Tryggvi	Arborg	
Foote, Stephanie	Killarney	
Forness, Sandra	Sprague	
Funk, Russell	Landmark	Animal Nutrition Association on Canada
Gagne, Gabriel	La Broquerie	
Gendreau, Luc	Menisino	
Georgison, John	Winnipeg	Georgison Farms Ltd.
Gonyou, Harold	Saskatoon SK	Prairie Swine Centre Inc.
Gould, Dickson	Landmark	Elite Swine
Greenlay, Gerald	Carberry	Cypress Planning District
Grower, Joanne	Winnipeg	
Gudmundson, Donna and Warren	Arborg	
Hand, Robert	Winnipeg	Freshwater Fish Corporation
Harris, Dawn	Ile de Chenes	
Harrison, Bill	Altamont	Roseisle Creek Watershed Association
Heapy, Richard	Oak River	Rural Municipality of Blanshard
Hetlund, Layne	Winnipeg	
Iftody, David W.	Steinbach	Provencher Agricultural Advisory Committee
Jackson, Darryl	Souris	Souris & District Chamber of Commerce
Jensen, Debbie	Arborg	

Kelly, Penny	Winnipeg	Manitoba Egg Producers
Keyes, Shirley	Killarney	
Klenk, Steffen	Airdrie AB	PIC Canada Ltd.
Klippenstein, Dan	Niverville	
Krentz, Cliff	Edmonton AB	Regent Biologic Inc.
Lague, Claude	Saskatoon SK	University of Saskatchewan
Leschyshyn, Joe	Chatfield	
Liebzeit, Frank	Winnipeg	
Loeppky, Lorne	Niverville	
Loeppky, Ruth	Niverville	
Lockhart, Lyle	Winnipeg	Freshwater Institute
Lupky, Sigurbjord	Arborg	
Maley, Diane	Menisino	
Martin, Doug	Selkirk	President, S.I.L.M.A.
Martin, J.	Powerview	
McBurney, Dale	Souris	Hogs is Beautiful Inc.
McCartney, Allan (Mr. & Mrs.)	Macdonald	
McFayden, Wanda	Winnipeg	Manitoba Cattle Producers Association
McLaughlin, Neil	Middleboro	
Mowbray, Thomas J.	Roblin	Rural Municipality of Roblin
Muir, Ted	Winnipeg	Manitoba Pork Council
Nation Robert (Mr. & Mrs.)	Winnipeg	
Navratil. Tanya	Sprague	
Neudorf, Abe	Altona	
Neustaedter, Paul	Steinbach	Steinbach Auto Dealers Association
Oakley, J.	Powerview	
Patience, John	Saskatoon SK	Prairie Swine Centre Inc.
Penner, Leo	Blumenort	L.U.D. of Blumenort
Penner, Reginald	Blumenort	Penner Farm Services
Peters, Jake (Mr. & Mrs.)	Landmark	
Pip, Eva	Winnipeg	University of Winnipeg
Pirie, Arnold	Strathclair	Rural Municpality of Strathclair
Podolsky, John	Winnipeg	Gardenton Concerned Citizen's Committee
Poetker, Bill and Steve	Killarr ey	
Popp, Max	Winnipeg	
Potter, Cecelia	Winnipeg	
Price, J.	St. Francois Xavier	
Rigby, Grant	Killarney	
Ripley, Joy	Nepean	Canadian Federation of Humane Societies
Robins, Harle	Winnipeg	
Rutherford, Randy	Gross Isle	
Schneider, Paul	St. Pierre	
Schweitzer, Larry	Hamiota	Hamiota Feedlot Ltd.
Shultz, T.M.	Winnipeg	
Sloane, Willim	Pilot Mound	
Smyrski, Tracy	Seddons Corner	
Sokulski, Adeline	Winnipeg	
Sparkes, Wanda	Arborg	
Stokowski, Robert J.	Edmonton AB	Regent Biologic Inc.

Storie, Betty	Killarney	
Tokarchuk, Jim	Winnipeg	Prairie Farm Rehabilitation Administration
Tymchur, Elizabeth	Winnipeg	
Tyrchniewicz, Allen	Winnipeg	International Institute for Sustainable Development
Van Slyke, J.V.	Vancouver BC	A.T.D. Waste Systems Inc.
Wanke, Fred	Menisino	
Warkentine, Randy	Winkler	
Watson, Herb and Shirley	Treherne	
White, James	Boissevain	
Whittington, D. Lee	Saskatoon	Prairie Swine Centre Inc.
Wollman, Martin	Neepawa	

APPENDIX C

PARTICIPANTS IN RESEARCH ROUND TABLES

(August 30, 31, and September 1)

WATER QUALITY

- Bob Betcher (Manitoba Conservation)
- Ross Bulley (Scientific Advisor)
- Shamez Danesh (Reid Crowther)
- Andrew Dickson (Manitoba Agriculture and Food)
- Digvir Jayas (Biosystems Engineering - U of M)
- Garland Laliberte (Manitoba Manure Management Initiative)
- Lyle Lockhart (Freshwater Institute)
- Peter Mah (Manitoba Intergovernmental Affairs)
- Ken McGill (Manitoba Agriculture and Food)
- Eva Pip (University of Winnipeg)
- Jim Poppelow (Manitoba Health)
- Alex Salki (Freshwater Institute)
- Steve Shepherd (ECOmatters)
- Mike Stainton (Freshwater Institute)
- Sylvio Tessier (Manitoba Agriculture and Food)
- Dwight Williamson (Manitoba Conservation)

AIR QUALITY

- Ken Adam (Reid Crowther)
- Dave Bezak (Manitoba Conservation)
- Ross Bulley (Scientific Advisor)
- Laurie Connor (Animal Science - U of M)
- Andrew Dickson (Manitoba Agriculture and Food)
- Garland Laliberte (Manitoba Manure Management Initiative)
- Peter Mah (Manitoba Intergovernmental Affairs)
- Gary Plohman (Elite Swine)
- Jim Popplow (Manitoba Health)
- Sylvio Tessier (Manitoba Agriculture and Food)

MANURE MANAGEMENT

- Cathy Buckley (Agriculture and Agrifood Canada)
- Ross Bulley (Scientific Advisor)
- Laurie Connor (Animal Science – U of M)
- Shamez Danesh (Reid Crowther)
- Bob Hoffman (Manitoba Rural Adaptation Council)
- Digvir Jayas (Biosystems Engineering – U of M)
- Garland Laliberte (Manitoba Manure Management Initiative)
- Gary Plohman (Elite Swine)
- Ranjan Sri Ranjan (Biosystems Engineering – U of M)
- Doug Small (DGH Engineering)
- Sylvio Tessier (Manitoba Agriculture and Food)
- Xiang Zhong (Biosystems Engineering – U of M)

MONITORING AND INFORMATION SYSTEMS

- Ross Bulley (Scientific Advisor)
- David Burton (Soil Science – U of M)
- Andrew Dickson (Manitoba Agriculture and Food)
- John Fitzmaurice (PFRA)
- Garland Laliberte (Manitoba Manure Management Initiative)
- Ron Lewis (PFRA)
- Peter Mah (Manitoba Intergovernmental Affairs)
- Hartley Pokrant (Manitoba Conservation)
- Ranjan Sri Ranjan (Biosystems Engineering – U of M)
- Mike Stainton (Freshwater Institute)
- Sylvio Tessier (Manitoba Agriculture and Food)
- Dwight Williamson (Manitoba Conservation)
- Karin Wittenberg (Animal Science –U of M)

APPENDIX D

ORGANIZATIONS AND PEOPLE VISITED OUTSIDE OF MANITOBA

Ottawa **September 13**

• Agriculture and Agrifood Canada, Environment Branch	Sheila Jones, Policy Analyst
• Canadian Federation of Agriculture	Sally Rutherford, Executive Director
• Canadian Pork Council	Eric Aubin, Hog Production Analyst Martin Rice, Executive Director

Montreal **September 14**

• Fédération des Producteurs de Porcs du Québec	Chantal Foulds, Agroenvironmental Advisor
• Union des Producteurs d'Agricole	Louis Menard, Coordinator of Environmental Strategies David Bernier Marlene Thiboutot

Saskatchewan **September 25 and 29**

• Prairie Agricultural Machinery Institute	Gordon Hultgreen, Manager of Soils and Crops Phil Leduc, Manager, Research and Development
• Prairie Swine Centre	John Patience, President
• University of Saskatchewan	Ernie Barber, Dean of the College of Agriculture Terry Fonstad, Department of Bioresource Engineering Claude Lague, Sask Pork Chair, Environmental Engineering Jeff Schoenau, Department of Soil Science
• Saskatchewan Agriculture and Food	Marilyn Jonas, Pork Central Oswald Henry, Consultant Abdul Jallil, Research Branch

Alberta **September 26 – 28**

• Alberta Agriculture, Food, and Rural Development	Les Lyster, Assistant Deputy Minister, Sustainable Agriculture Wayne Inkpen, Policy Secretariat Louise Starling, Head, Livestock Operations Branch Darcy Fitzgerald, Environmental Management Specialist Andy Cumming, ILO Engineer
• University of Alberta	John Feddes, Department of Agriculture, Food, and Nutritional Science
• Alberta Pork	Ed Schultz, General Manger
• University of Calgary	Merle Olson, Faculty of Medicine

• Oldman River Intermunicipal	Mike Burla, Senior Planner Service Industry
• Agriculture Canada Lethbridge Research Centre	Karen Beauchemin, Ruminant Nutritionist Andrew Olson, Technologist in Composting Research Darryl Gibb, Animal Nutritionist Helen Fairweather, Environmental Engineer
• Groenenboom Farms Ltd	Joe Groenenboom, Owner
• Schwartzkopf Farms Ltd	Bert Schwartzkopf, Owner Karen Schwartzkopf-Genswein, Feedlot Specialist, Alberta Agriculture
• Southern Alberta Environment Group	Cheryl Bradley Sylvia Campbell Paul Lewis